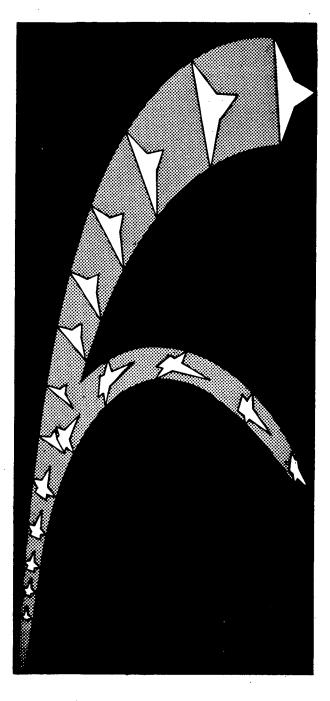
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DMS-DR-1222 CR-120,034 JANUARY 1973



SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER



-SPACE SHUTTLE-

PRESSURE INVESTIGATION OF A SPACE SHUTTLE LAUNCH CONFIGURATION CONSISTING OF A DELTA-WING ORBITER AND A SWEPT-WING BOOSTER WITH CANARD AND TIP FINS

 $[M=0.6\ T0\ 1.3]$

Volume 1-Part A Booster Data

by

J.M. Rampy, NSI K.L. Blackwell, MSFC G.R. Gomillion, ARO

4-FOOT TRANSONIC PROPULSION WIND TUNNEL

Arnold Engineeringမှိ Development Center

> This document should be referenced as NASA CR-120,034

PRESSURE INVESTIGATION OF A SPACE SHUTTLE LAUNCH CONFIGURATION CONSISTING OF A DELTA-WING ORBITER AND A (Chrysler Corp.)

Unclas

591

NASA Series Number: P-1001

DMS-DR-1222 Volume I - Part A CR-120,034

SADSAC/SPACE SHUTTLE

WIND TUNNEL TEST DATA REPORT

	ADAG Orbitan and Booston Shuttle Medels: 0 00556 Scale
CONFIGURATION:	MDAC Orbiter and Booster Shuttle Models; 0.00556 Scale
TEST PURPOSE:	Experimental Pressure Investigation of Space Shuttle Launch
	Vehicle at Mach Numbers of 0.6 to 1.3
TEST FACILITY:	AEDC-PWT Tunnel 4-T
TESTING AGENCY:	MSFC/AEDC
TEST NO. & DATE:	AEDC TC174 (PC1154); 11 through 13 October, 1971
FACILITY COORDINA	ATOR: L. L. Trimmer, ARO; J. F. Weaver, MSFC
PROJECT ENGINEER(S): J. M. Rampy, NSI
	K. L. Blackwell, MSFC
	G. R. Gomillion, ARO
	1
	DATA MANAGEMENT SERVICES
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for V. W.	Sparks H. 2. Zimmerle
• ,	

CONTRACT NAS 8-4016

RELEASE APPROVAL:

AMENDMENT 182

N. D. Kemp. Supervisor Aero Thermo Data Group

DRL 297 - 84a

This report has been prepared by Chrysler Corporation Space Division under a Data Management Contract to the NASA. Chrysler assumes no responsibility for the data presented herein other than its display characteristics.

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PRESSURE INVESTIGATION OF A SPACE SHUTTLE

LAUNCH CONFIGURATION CONSISTING OF A DELTA-WING ORBITER

AND A SWEPT-WING BOOSTER WITH CANARD AND TIP FINS

(M = 0.6 TO 1.3)

By J. M. Rampy, K. L. Blackwell, and G. R. Gomillion

SUMMARY

This report presents pressure data obtained from a wind tunnel test sponsored by the Marshall Space Flight Center (MSFC) and conducted in the FWT-4T facility of the Arnold Engineering Development Center (AEDC) from October 11 through October 13, 1971. The models tested were 0.00556 scale models of the McDonnell-Douglas orbiter and booster configurations. Pressure data were obtained for the combined orbiter and booster and for the booster alone at Mach numbers from 0.6 to 1.3, angles of attack from -8° to +10°, and sideslip angles from -6° to +6°. Pressure data was also obtained for the booster alone without canard at Mach numbers of 0.9 and 1.1 (nominal). The pressure taps were distributed primarily over the booster upper surface and the orbiter lower surface.

The models were mounted on individual stings which allowed various incidence angles and longitudinal positions of the orbiter relative to the booster. Orbiter incidence angles of 0°, 1.9°, and 3.8° were obtained at the most aft position of the orbiter, and three longitudinal positions were obtained at 0° incidence. The vertical separation distance between the orbiter lower

SUMMARY (Concluded)

surface and the booster upper surface was nominally zero. These test results supplement the data presented in references 1 and 2.

Plotted data for this test is published under one report number (DMS-DR-1222) in two volumes: volume 1, parts A and B, contains the plotted data for the booster alone and in the presence of the orbiter, and volume 2 contains the plotted data for the orbiter in the presence of the booster.

NOMENCLATURE

AEDC TC 174

	SADSAC	1
SYMBOL	SYMBOL	DEFINITION
a ,		Speed of sound; m/sec, ft/sec
b/2	:	Vehicle wing semi-span; in.
С	:	Local airfoil chord; in.
c.g.		Center of gravity
CP	CP	Pressure coefficient, P _L - P _∞
L	L	Body length; in.
M_{∞}	Ml	Free stream Mach number; V/a
P L		Local static pressure; psia
P_{O}	÷	Free stream total pressure; psia
P_{∞}		Free stream static pressure; psia
q		Dynamic pressure; psi
RN/L		Unit Reynolds number; per foot
To		Freestream total temperature, F
v		Velocity; m/sec, ft/sec
x		Distance from vehicle nose; in.
x/c	x/c	Local chordwise position/local chord length
x/L	X/L	Longitudinal position/body length
у	·	Distance from lateral centerline, in.
y/b/2	Y/B	Local spanwise position/wing semi-span

NOMENCLATURE (Concluded)

AEDC TC 174

SYMBOL	SADSAC SYMBOL	DEFINITION
$\alpha_{\mathbb{B}}$	ALFB	Booster angle of attack; degrees
α_{O}	alfø	Orbiter angle of attack; degrees
i	I	Incidence angle between the orbiter and booster, $I = \alpha_0 - \alpha_B$; degrees
β	BETA	Angle of sideslip; degrees
θ	THETA	Angle measured from vehicle top center- line; degrees
Δx/L	DX/L	Distance between the c.g. of the orbiter and booster measured parallel to the longitudinal axis of the booster, positive when the orbiter c.g. is forward of the booster c.g., the distance has been normalized with respect to the booster fuselage length (16.184 inches)

APPARATUS AND MODELS

The models tested were .00556 scale models of the MDAC orbiter and booster, figures 3 and 4, respectively. The orbiter is basically the configuration illustrated on MDAC drawing number 255BJ0050. Modifications made on the orbiter to allow for installation of the nozzle assembly are shown in figure 3.

The booster configuration is basically the configuration designated 19A by MDAC (drawing number 256-19-0001). The body, wing, and canard of the booster model are that of configuration 19A except that the body does not have a base flare or boattail, figure 4. The vertical tails are those which were designed for the configuration designated 17 (drawing number 256-17-001).

The booster model was tested alone with and without canard, and the complete booster and orbiter models were tested together. The orbiter and booster models were mounted on individual stings as shown by figures 6 and 7. The orbiter could be moved fore and aft with respect to the booster and small variations of the orbiter/booster relative incidence angle could be obtained. The vertical separation distance (minimum gap) between the orbiter lower surface and the booster upper surface was nominally zero. The **values** of the relative incidence angle, I, and the longitudinal separation variable, DX/L, are listed in Table II entitled "Pressure Dataset Collation Sheets".

Dimensional data for both vehicles are shown in Table V. The pressure tap layout is shown in figures 1 and 2, and the exact tap locations are given in tables III and IV.

TEST FACILITY DESCRIPTION

The 4-Foot Transonic Propulsion Wind Tunnel (PWT-4T) is a closed-loop, continuous flow, variable density facility with a 4- by 4-foot square test section and a Mach number range of 0.1 to 1.4. The tunnel has a stagnation pressure range of 300 to 1700 psf, and a stagnation temperature range of 80° to 130°F. The test section is equipped with variable porosity walls with an available porosity range of 0 to 10 percent open area. A complete description of the PWT-4T tunnel can be found in reference 3.

DATA REDUCTION

The longitudinal separation variable DX/L is referenced to nominal center of gravity locations on the orbiter and booster and to the booster body axis system. The orbiter model c.g. was located 4.917 inches aft of the orbiter model nose, and the booster model c.g. was located 7.528 inches aft of the booster model nose. The DX/L distance is measured parallel to the longitudinal axis of the booster and between the nominal center of gravity points on the orbiter and booster, as illustrated in figure 5. The value of DX/L is positive when the orbiter c.g. is forward of the booster c.g. DX/L is normalized using the booster fuselage length of 16.184 inches.

REFERENCES

- 1. Strike, W. T. Jr., "Abort Separation Pressure Distributions on McDonnell-Douglas Space Shuttle Configurations at Mach Numbers 2.3 and 5", AEDC-TR-72-46, May 1972.
- 2. "Space Shuttle Abort Separation Pressure Investigation", NASA CR-120,008, June 1972.
- 3. "Test Facilities Handbook", Arnold Engineering Development Center, December 1969.
- 4. Lane, David G., "Pretest Information For A Proposed Space Shuttle Launch Configuration Pressure Investigation To Be Conducted At AEDC PWT-4T", MSFC Pretest Report, July 1971.

TABLE I TEST CONDITIONS TEST TC 174

MACH NUMBER	REYNOLDS NUMBER per unit length	DYNAMIC PRESSURE (pounds/sq. foot)	STAGNATION TEMPERATURE (degrees Fahrenheit)
0.6	2.0 x 10 ⁶	238	
0.9	2.4 x 10 ⁶	402	
1.0 .	2.5 x 10 ⁶	441	
1.1	2.5 x 10 ⁶	478	
1.2	2.5 x 10 ⁶	498	
. 1.3	2.5 x 10 ⁶	:510	
		·	
			80° to 110° F
			(overall range)
		·	
·			

BALANCE UTILIZED:	· · · · · · · · · · · · · · · · · · ·	
CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF		
SF		
AF		
PM		

RM		
COMMENTS:	•	

TABLE II
TEST _AEDC_TC_174__ PRESSURE DATASET COLLATION SHEET

PRETEST POSTTEST

	NOTE (1):			,		TC 014	TC0/3	TC0/2	76011	TCOIO	7c 009	7८०७३	16007	TCOOL	76005	76004	17.003	16002	TC001	IDENTIFIER	
	(1): First character of each		-	-		CANARD OFF	←	BOOSTER ALONE	<u> </u>										BOOSTER /ORBITER A + hrough I		CONFIGURATION
canard,	dataset				•	A,BC,E	∢`	A, B,C, D, E	<				-						A through I	SECTION	MODEL
base, a	identifier denotes model																			CONFIG.	GEO.
and orbiter body, upper wing,	ier de					<u>ک</u>	<i>⊙</i> °	A O	A 0°	A O _o	<i>O°</i> ≯	+6°	-6° →	△2 O°	A	+6° B	60	0° 8	> 0°	αβ	SCHD.
iter b	notes																				PAR,
ody, ı	model					1	1	1	<u>∵</u> ⊙°	3.8°	.9	<u> </u>			•0				ू	i ax	PARAMETER/VALUES
ipper	section:	<u> </u>				1	1	1	.1943	<u> </u>					.0367	V			0	1/2	VALUES
1 :	A		·															-		RUNS	10 10
lower wing,	through I						7	7.	7	v	7	1	7	7	7	7	i	5.	7	.6	T
						7	7	7	7	7	7	Š	7	7	Ġ	7	7	ς.	ζ	.9	
and b	refer t						7	7	7	7	7	Ì	,	7	q	7	5	5	ζ.	1.0	MAC
base,	to booster body,					7	7	7	7	7	7	7	۲	7	1	0	1	7	(1.1	MACH NUMBERS
respe	ster 1						7	ζ.	7	7	7	1	7	7	7	Ü	U	5	7	1.2	ERS
respectively.	body.						7	1	7	σ	7	7	.5	1	7	D	trj.	7	ζ.	7.3	
y.																					

 α OR β SCHEDULES

 $B(\beta)=-6,-4,-2,0,+2,+4,+6$ degrees

 $A(\alpha)=-8,-6,-4,-2,0,+2,+4,+6,+8,+10$ degrees

 $p(\beta)=-4$, +4 degrees (plotted data includes $\beta=0$ at $\alpha=-6$ or +6 from corresponding α -variant dataset)

 $C(\beta)=-4,-2, 0,+2,+4$ degrees

 $P(\alpha)$ -partial schedule A

9

TABLE III
ORBITER PRESSURE TAP LOCATIONS

Tap	т	AP LOCAT	TION	Tap	Т	AP LOCAT	TION
No.	(x/L) _o	(y/b/2) _o	Surface	No.	(x/L) _o	(y/b/2) _o	Surface
1	0	o	Lower Body	28	.498	.231	Lower Wing
2	.019			29	.586		1
3	.066			30	.674		
4	.145			31	.762		
5	.233			32	.854		
6	.321	,		33	.944	. ↓	
7	.409			34	.674	.400	
8	.498			35	.762		
9	.586			36	.854		
10	676			37	.942		
11	.765			38	.764	.569	
12	.854			39	.854	1	
13	.943			40	.942		j
14	.981	+		41	.852	.738	
15	.149	.077		42	.942	1	1
16	.233	1		43		Y 0	V Upper Base
17	.321			44		.138	Lower Base
.18	.409		İ	45	.981	007	Upper Wing
19	.498			46	.981	.289	obber und
20	.586	. ↓		47	.939	1	
25	.233	.191		48	.851		
26	.321	.221	₩	49	.981	∀ .400	
27	.409	.231	Lower Wing	50	.939	.∓00	

x = Distance from orbiter nose

y = Distance from orbiter centerline

L = Orbiter length 27.153 cm (10.690 in.)

b/2 = Orbiter wing semi-span 8.255 cm (3.250 in.)

TABLE IV
BOOSTER PRESSURE TAP LOCATIONS

T:	ар		TAP LOC	ATION	Тар		TAP LOC	ATION
Ne		(x/L) _B	$(y/b^{2})_B$	Surface	No.	(×/L) _B	$\left (y/b/2) \right _{\rm B}$	Surface
	1	.004	0	Body $\mathcal{G}, \theta = 0^{\circ}$	30	.243	.092	Body, $\theta = 24^{\circ}$
ł	2	.014	: [31	.305		1
	3	.025			32	.367		
	4	.062			33	.490		
	5	.120			34	.613		
	6	.181	,		35	.737		
	7	.243		:	36	.798		
ļ	8	.305			37	.860		ı
	9	.366			38	.921		
1	0	.490			39	.983		
1	1	.613			40	.062	.155	Body, θ = 45 ⁰
1	2	.737			41	.124		
1	3	.799		,	42	.185		
1	4.	.859			43	.247		·
1	5	.921			44	.309		
1	6	.983	†	↓	45	.371		
1	7	.062	.018	Nose Section	46	.494		
1	8	.120	.037		47	.618		
1	9	.181	.046		48	.741	₩	
2	0	.243	1	+	49	.988	.220	Body, $\theta = 90^{\circ}$
	1	.309	.220	Body, θ=90°	93	.998	0	Base, $\theta = 0^{\circ}$
i	2	.371			94		.193	90°
1	3	.494			95		193	270 ⁰
1	4	.618			96		0	180°
_	5	.741	·		97	.803		Body, $\theta = 180^{\circ}$
1	6	.803		·	98	.865		1 1
1	7	.851			99	.927		
2	- 1	.896			100	.988		
2	9	.942	†	+			†	+

x = Distance from booster nose

y = Distance from booster centerline

L = Booster length 41.107 cm (16.184 in.)

b/2 = Booster semi-span 13.805 cm (5.435 in.)

TABLE IV (Continued)
BOOSTER PRESSURE TAP LOCATIONS

Tap		TAP LOCA	Tap	T	AP LOC	ATION	
No.	(x/c) _B	(y/b /2) _B	Surface	No.	(x/c) _B	$(y/b/2)_B$	Surface
5.2	000	221	**************************************	71	210	425	
53	.098	.221	Upper Wing	71	.718	.635	Upper Wing
54	.320			72	.926	+	
55	.542			73	.066	.773	
56	.763		·	74	.275		
57	.985	. ↓		75	.484		1
58	.101	.359		76	.696		
59	.320			77	.896		. ↓
60	.542			83	.195	.565	Upper Canard
61	.762			84	.716	↓	
62	.970	. ↓		85	.195	.879	
63	.103	.497		86	.716	1	
64	.319			87	.514	.230	Lower Wing
65	.528			88	.737		1
66	.741			89	،960		
67	.948	. ↓		90	.496	.368	
68	.081	.635		91	.718		
69	.292			92	.940		
70	.507		↓				. ↓

x = Distance from airfoil leading edge

y = Distance from booster centerline

c = Local airfoil chord

b/2 = Booster wing semi-span 13,805 cm (5.435 in.) for wing taps

b/2 = Booster canard semi-span 6.071 cm (2.390 in.) for canard taps

TABLE IV (Concluded)
BOOSTER PRESSURE TAP LOCATIONS

Surface	(y/b/2) _B	Local Chord,cm	Local Chord, in.
Wing	.221	8.387	3.302
	.359	7.640	3.008
	.497	6.962	2.741
	.635	6.116	2.408
	.773	5.301	2.087
	.230	8.336	3.282
+	.368	7.564	2.978
Canard	.565	4.877	1.923
1	.879	4.877	1.923

TABLE V. DIMENSIONAL DATA

MODEL COMPONENT: BODY - MDAC Orbit	er)
GENERAL DESCRIPTION: Basic fuselage con	tours including car	nopy with modified
aft fuselage cross sections; cross-sections	onal shape constant	from station and
to end of fuselage - model scale 1/120.		210m station 1500
DRAWING NUMBER: 255 BJ 00060,	Rev. B	•
DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	200 1	
Max. Width	<u> 156.4</u>	
Max. Depth	27.1	.150
·	30.3	.163
Fineness Ratio		
Area		
Max. Cross-Sectional		
Planform		
Wetted		
Base		

MODEL COMPONENT: Wing - MDAC Orbiter		
GENERAL DESCRIPTION: Model Scale 1/180		
DRAWING NUMBER: 255 BJ 00050, 1	Rev. B	,
DIMENSIONS:	FULL-SCALE	MODEL SCALE
TOTAL DATA		WOOLE SOME
Area, ft ²		
Planform	5330.0	161,
Wetted		- 104
Span (equivalent), fr Aspect Ratio	97.5	.542
Rate of Taper	1.79	1.79
Taper Ratio	.230	.230
Diehedral Angle, degrees	10.0	10.0
Incidence Angle, degrees Aerodynamic Twist, degrees	2.0	2.0
ration, degrees	0	0

Sweep Back Angles, degrees		
Leading Edge Trailing Edge	55.0	55.0
0.25 Element Line	1.7 0	0
Chords:	47.0	47.0
Root (Wing Sta. 0.0), inches	<u>108li.8</u>	6.027
Tip, (equivalent), inches	<u>2l,9.6</u>	1.307
Fus. Sta. of .25 MAC	<u>754.3</u>	lı.193
W.P. of .25 MAC		
Airfoil Section		
Root (B.L. 162)	0010-64	0010-64
Tip (B.L. 540)	0009-64	0009-64
EXPOSED DATA	•	
Area, 67	2218 2	
Span, (equivalent), FT	3147.3 70.5	
Aspect Ratio	1.53	.392 1.50
Taper Ratio		1.20
Chords Root, inches	000	
Tip, inches	855.0	4.750
MAC	2l.9.6 607.2	$\frac{1.367}{3.333}$
Fus. Sta. of .25 MAC		3.373
W.P. of .25 MAC		-

ENERAL DESCRIPTION: Model Scale 1/18	30	
		exceleinteetunden stromagnesse varange
RAWING NUMBER: 255 BJ 00050	D, Rev. B	•
IMENSIONS:	FULL-SCALE	MODEL SCAL
TOTAL DATA	**************************************	
Area, ft ²		
Planform	570.0	,01 ³
Wetted		
Span (equivalent), ft. Aspect Ratio	27.5	.153
Rate of Taper	9	
Taper Ratio	.638	.63 3
Diehedral Angle, degrees		
Incidence Angle, degrees	Control to the second second	
Aerodynamic Twist, degrees		
Toe-In Angle		
Cant Angle		
Sweep Back Angles, degrees		
Leading Edge	30.0	30.0
Trailing Edge	13.li 26.2	13.1:
0.25 Element Line Chords:	20.2	26.2
Root, inches	309.6	1.720
Tip, (equivalent), inches	196.3	1.093
MAC, inches	21.4	.119
Fus. Sta. of .25 MAC		·
W.P. of .25 MAC	•	**************************************
Airfoil Section		
Root	0009-64	0009-64
Tip	<u>0009-61</u>	0009-64
EXPOSED DATA	•	•
Ano. 2	580.0	.018
Area, ft ² Span, (equivalent), fr	27.5	.153
Aspect Ratio		
Taper Ratio	.638	.63 8
Chords		
Root, inches	309.6	$\frac{1.720}{1.093}$
Tip, inches	196.3	1.093
MAC, inches	21.4	.119
Fus. Sta. of .25 MAC	Spaling and the second	·
₩ -2. of .25 MAC	6	***************************************

GENERAL DESCRIPTION:	Configuration 19	A fuselage without ba	se ~~~ and boatta
	Model Scale 1/18		
DRAWING NUMBER:	256-19-0001	, Rev. A	
DIMENSIONS:		FULL-SCALE	MODEL SCALE
Length (Ft)	•	241.7	1.343
Max. Width (Ft)		34.0	.139
Max. Depth (Ft)		34.0	.139
Fineness Ratio			
Area			
Max. Cross-S	iectional		
Planform			
Wetted	. <u>.</u>		-
Base	:		

MODEL COMPONENT: Wing - MDAC Booster		
GENERAL DESCRIPTION: Configuration 19A Wing		
Model Scale 1/180	and a state of the	•
		•
DRAWING NUMBER:		•
DIMENSIONS:	FULL-SCALE	MODEL SCALE
TOTAL DATA	•	
Area, ft ² Planform Wetted Span (equivalent), ft. Aspect Ratio Rate of Taper Taper Ratio Diehedral Angle, degrees	6020.0 146.0 3.54 135 7.67	.136 .811 3.54 .435 7.67
Incidence Angle, degrees Aerodynamic Twist, degrees		3.0
Sweep Back Angles, degrees Leading Edge Trailing Edge 0.25 Element Line Chords:	<u>144.0</u>	孙-0
Root (Wing Sta. 0.0), inches Tip, (equivalent) MAC, inches Fus. Sta. of .25 MAC, inches W.P. of .25 MAC, inches B.L. of .25 MAC, inches Airfoil Section	690.0 300.0 520.0 3625	3.333 1.667 2.889 20.139
Root Tip EXPOSED DATA	0010-64	0010-64 0010-64
Area , ft ² Span, (equivalent) , ft. Aspect Ratio Taper Ratio Chords	1190.0	.129
Root, inches Tip, inches MAC Fus. Sta. of .25 MAC	594.0 300.0	3.300 1.667
W.P. of .25 MAC		

MODEL COMPONENT: Vert	ical Tails -	MDAC Boo	ster	
GENERAL DESCRIPTION: Conf	iguration 17	Vertical	Tails	· •
Mode	l Scale 1/18	0		
DRAWING NUMBER:	256-17-000	l, Rev. A		
DIMENSIONS:			FULL-SCALE	MODEL SCALE
TOTAL DATA (Values for	one)			
Area Planform (True (Side Span (equivalent) Aspect Ratio Rate of Taper Taper Ratio Toe-In Angle Cant Angle Sweep Back Angles Leading Edge Trailing Edge O.25 Element L Chords: Root Tip, (equivalent MAC, inches Fus. Sta. of .25 MAC	Projection) , inches , degrees ine nt), inches 25 MAC		433 397 276 1.21 .520 .520 .60 25 140 300 156 236	.014 .012 1.533 1.21 .520 0 25 40
Airfoil Section Root	•	NACA	6)14-009	NACA 64A-009
· Tip		NACA	611A-009	NACA 64A-009
EXPOSED DATA			·	
Area Span, (equivalent) Aspect Ratio Taper Ratio Chords Root Tip MAC Fus. Sta. of .2				
W.P. of .25 MAC		19		

MODEL COMPONENT: Canard - MDAC Booster	
GENERAL DESCRIPTION: Configuration 194	Canard
Model Scale 1/180)
DRAWING NUMBER: 256-19-001, Rev.	<u>A</u>
DIMENSIONS:	FULL-SCALE MODEL SCALE
Theo. Area, Ft ² Exp Area, Ft ² Aspect Ratio Chord (Incl. Flap), Ft Airfoil (360 In. Theo Chord) NAC	1660 .051 1215 .033 3.0 3.0 23.625 .131

TABLE VI. INDEX OF MODEL FIGURES

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3•	Modifications to Orbiter Model	i	26
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6.	Rear View of Models and Test Apparatus		29
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TABLE VII. INDEX OF DATA FIGURES

VOLUME I - PARTS A AND B

L						
· .	692-1108	ALFB or BETA, Y/B, MACH	X/C	CP vs.	Wing	Chordwise Distribution of Booster Upper and Lower Wing Pressures
	557-691	ALFB or BETA, Y/B, MACH	x/c	CP vs.	Canard	Chordwise Distribution of Booster Canard Pressures
						PART B
	418-556	ALFB or BETA, MACH	THETA	CP vs.	Fuselage Base	Radial Distribution of Booster Base Pressures
- 	1-417	ALFB or BETA, THETA, MACH	T/X	CP vs.	Fuselage	Longitudinal Distribution of Booster Fuselage Pressures
						PART A
	PAGES	(1) CONDITIONS VARYING	'	TOIA TOTA	VEHICLE SECTION	TITLE

- Notes: (L) Conditions listed are those which vary in each dataset plotted. A complete list of configurations and varying parameters is given in Table II, "Pressure Dataset Collation Sheets".
- (2) dataset identifier as listed in Table II. Dataset plotting order for each section is numerical sequence of
- (3) The varying legend dimension for the fuselage, THETA, and for the canard, wing upper surface, and wing lower surface, Y/B, is plotted two values per page on side-by-side plot grids. The first value listed plotted on the left plot grid. in the legend table under the dimension name corresponds to the data

TABLE VII. INDEX OF DATA FIGURES

VOLUME II

334-444	ALFB or BETA, Y/B, MACH ALFB or BETA, MACH	CP vs. X/L CP vs. ALFB or BETA	Upper Wing Base	Iongitudinal Distribution of Orbiter Upper Wing Pressures Orbiter Base Pressures (Iover Base Pressure Tap)
1-333	ALFB or BETA, Y/B, MACH	CP vs. X/L	Fuselage, Lower Wing	Longitudinal Distribution of Orbiter Fuselage Pressures Longitudinal Distribution of Orbiter Lower Wing Pressures
PAGES	(i) CONDITIONS VARYING	TYPE OF PLOT	VEHICLE SECTION	TITLE

- Notes: (1) (2) Conditions listed are those which vary in each dataset plotted. A complete list of configurations and varying parameters is given in Table II, "Pressure Dataset Collation Sheets".
- sections, individually, is numerical sequence of dataset identifier as Dataset plotting order for fuselage and lower wing sections is FTC001, HTC001, HTC002, etc., in numerical sequence up to 11 datasets for each section. Dataset plotting order for upper wing and base listed in Table II.
- (3)grids. upper wing sections is plotted two values per page on side-by-side plot The varying legend dimension, Y/B, for the fuselage, lower wing, and name corresponds to the data plotted on the left plot grid. The first value listed in the legend table under the dimension

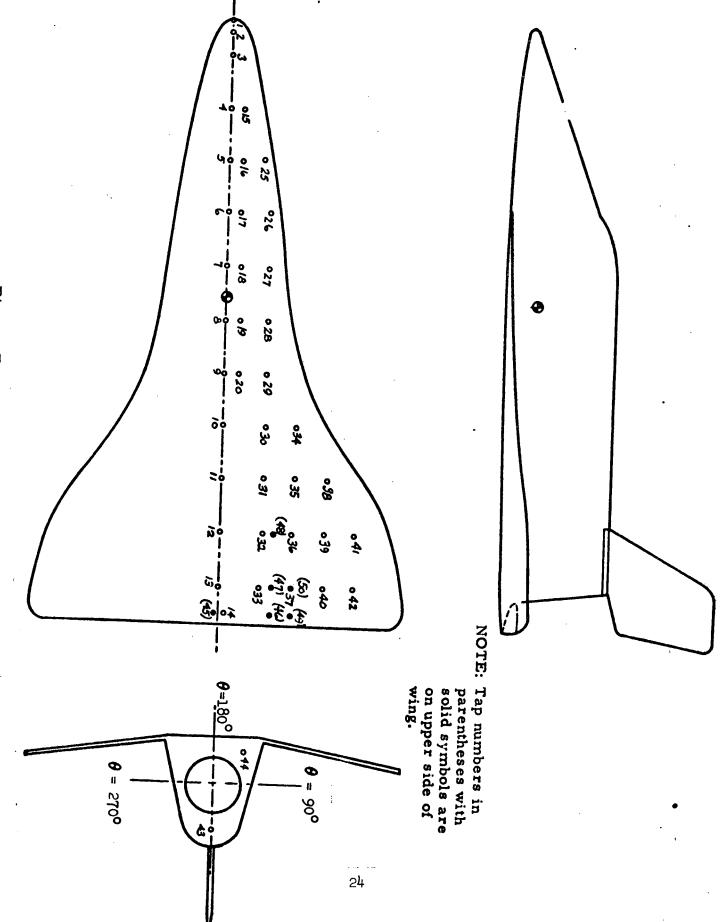


Fig. 1. - Pressure Tap Layout - Orbiter

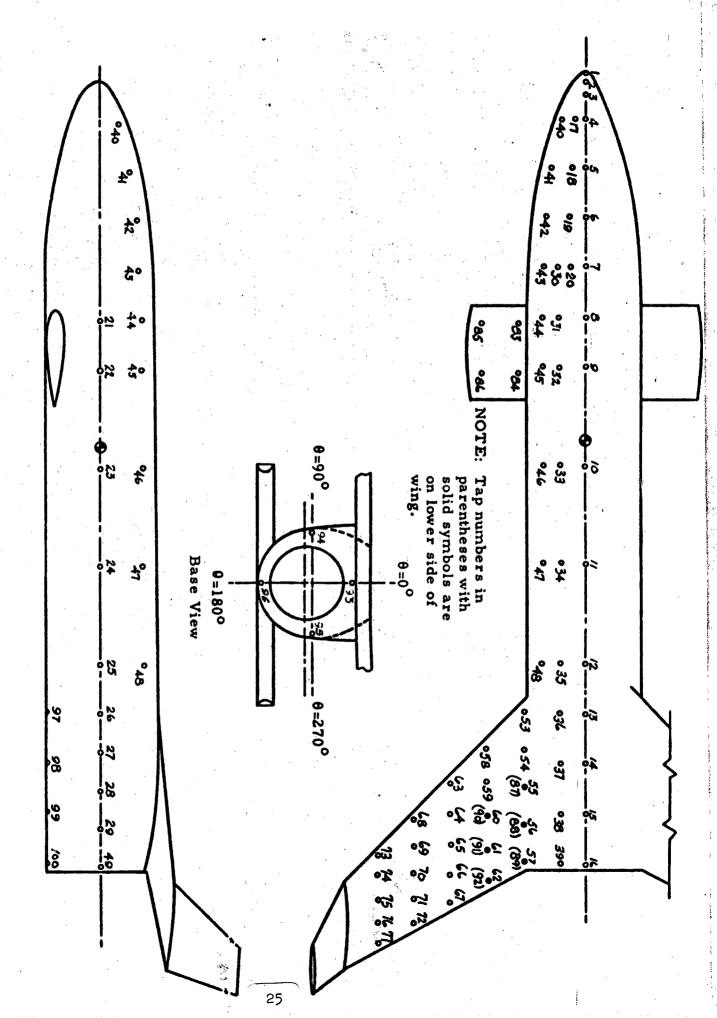


Fig. 2 - Pressure Tap Layout - Booster

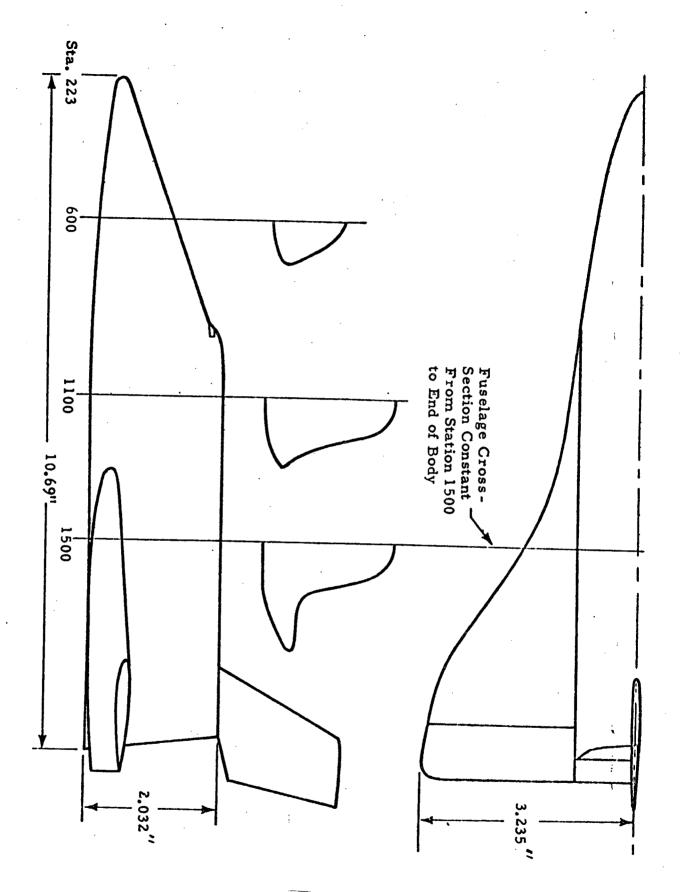


Fig. 3 - Modifications to Orbiter Model

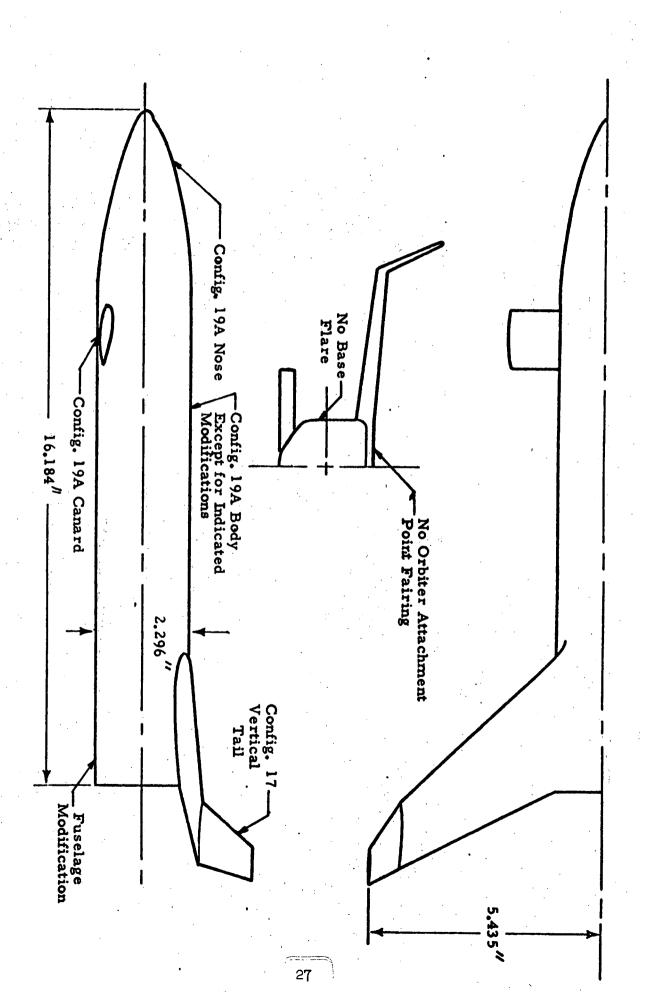


Fig. 4 - Modifications to Booster Model

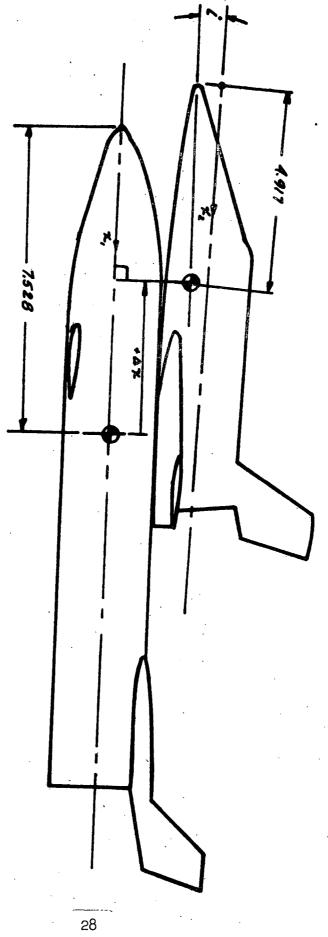


Figure 5: Model Separation Variables

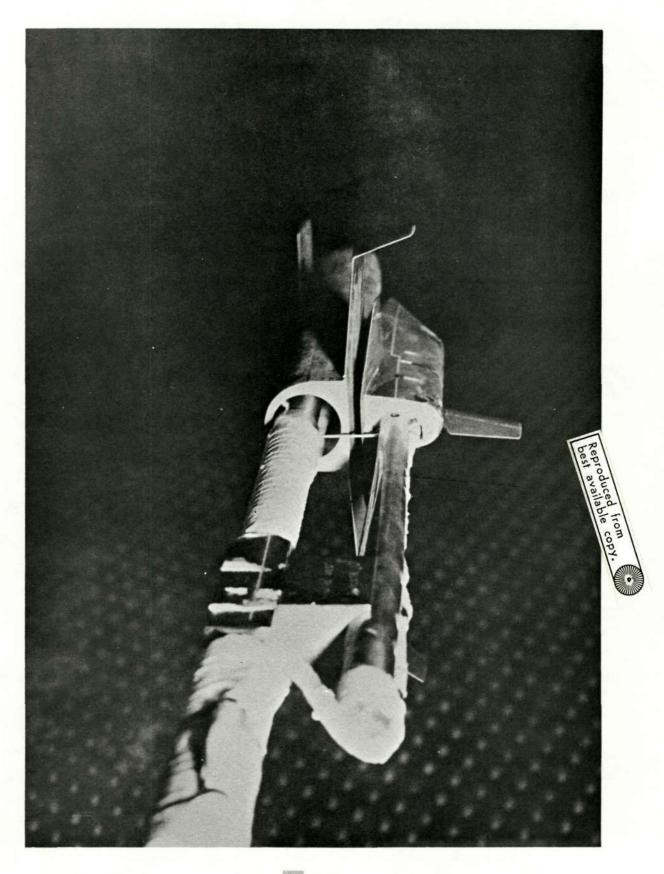


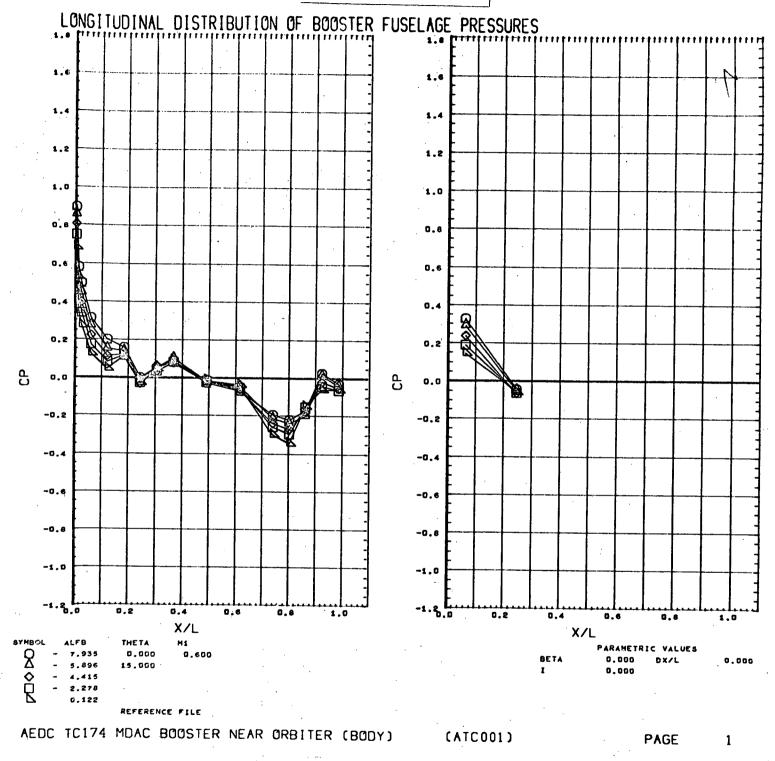
Figure 6. Rear View of Models and Test
Apparatus



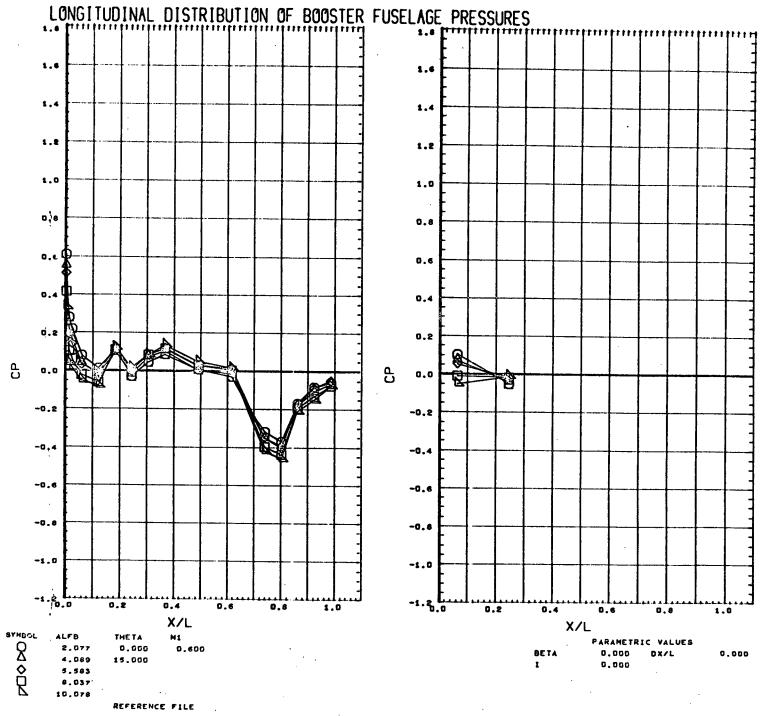
DATA FIGURES

Tabulations of the plotted data and corresponding source data are available from SADSAC Operations.

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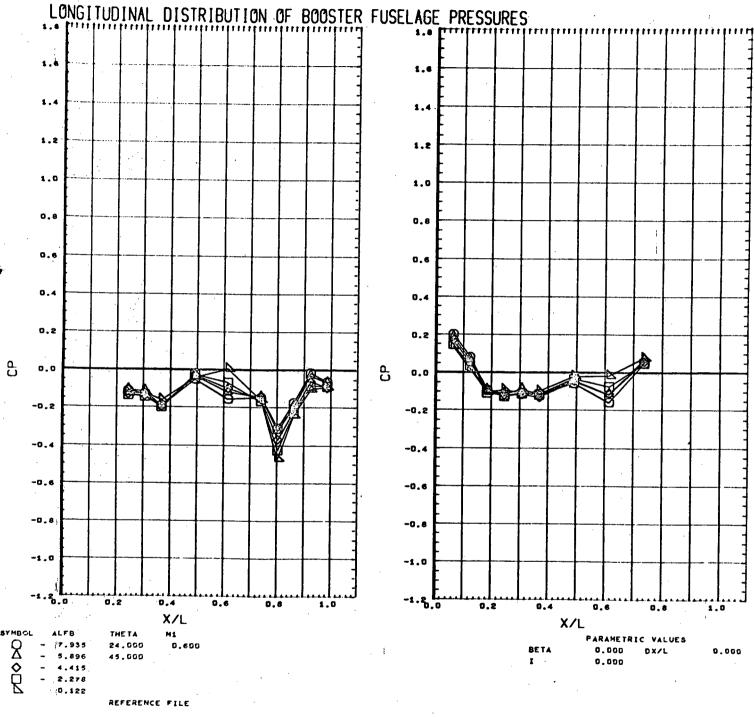


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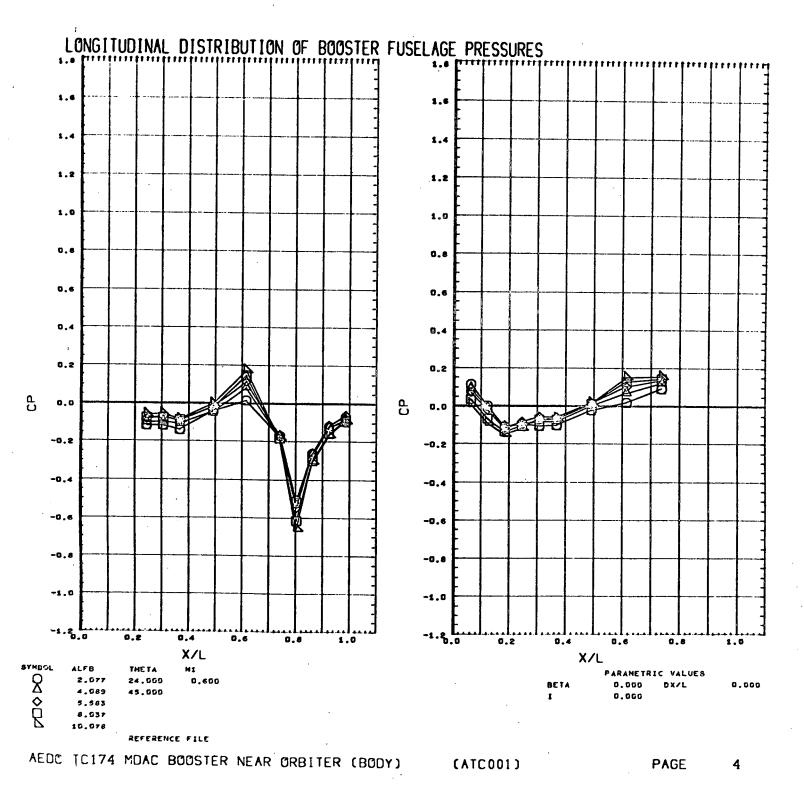
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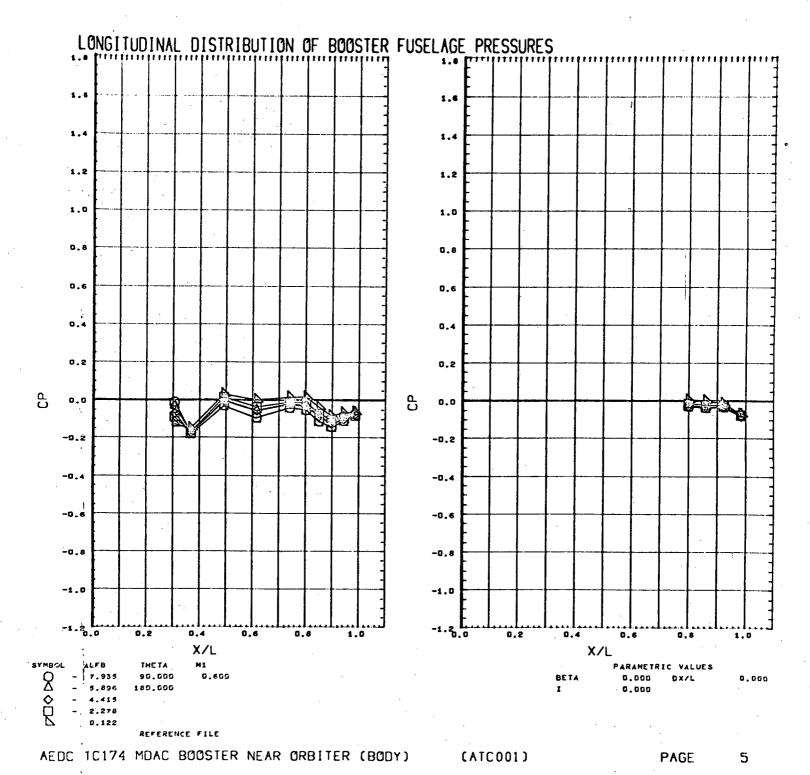
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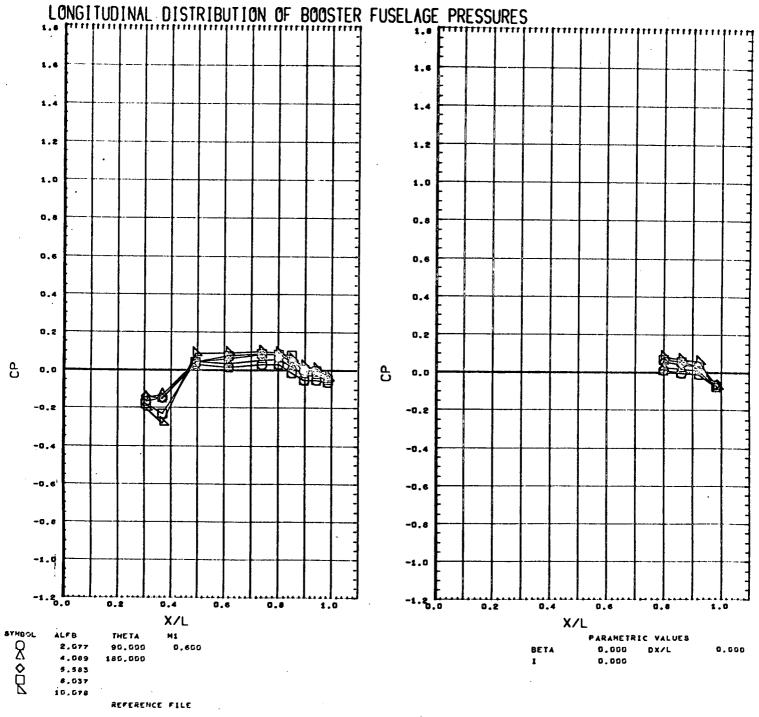


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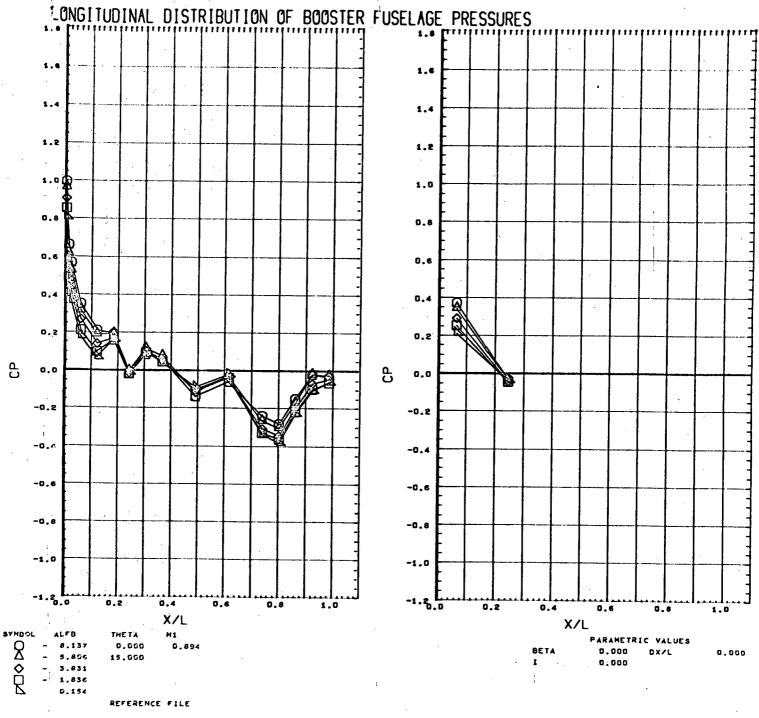






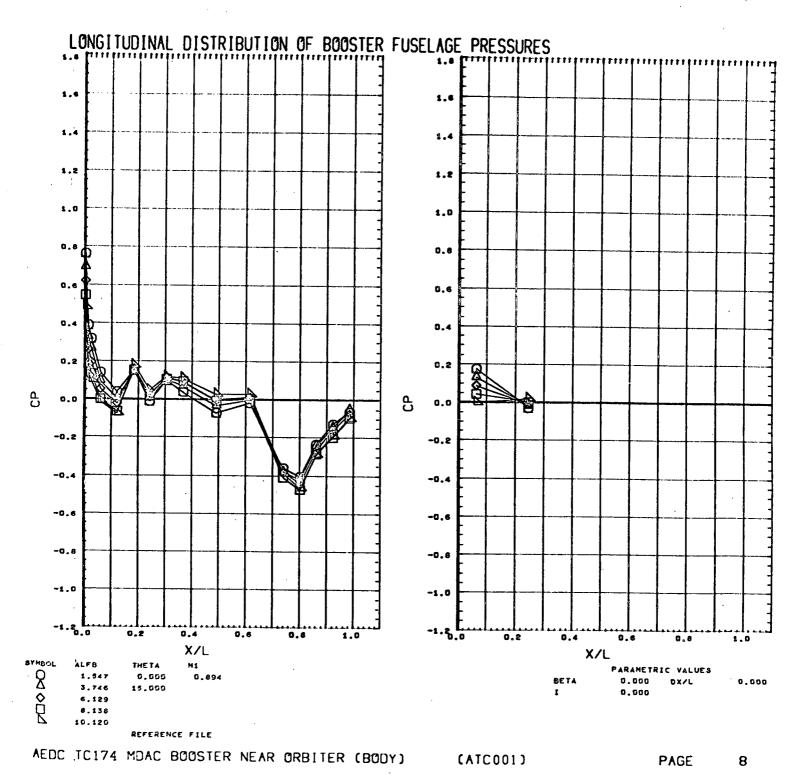
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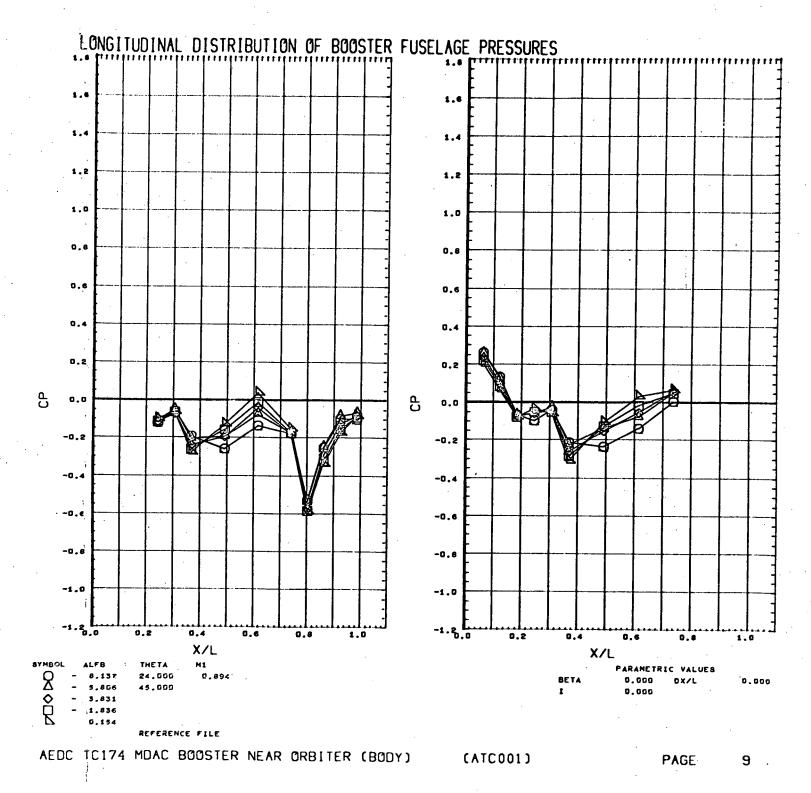
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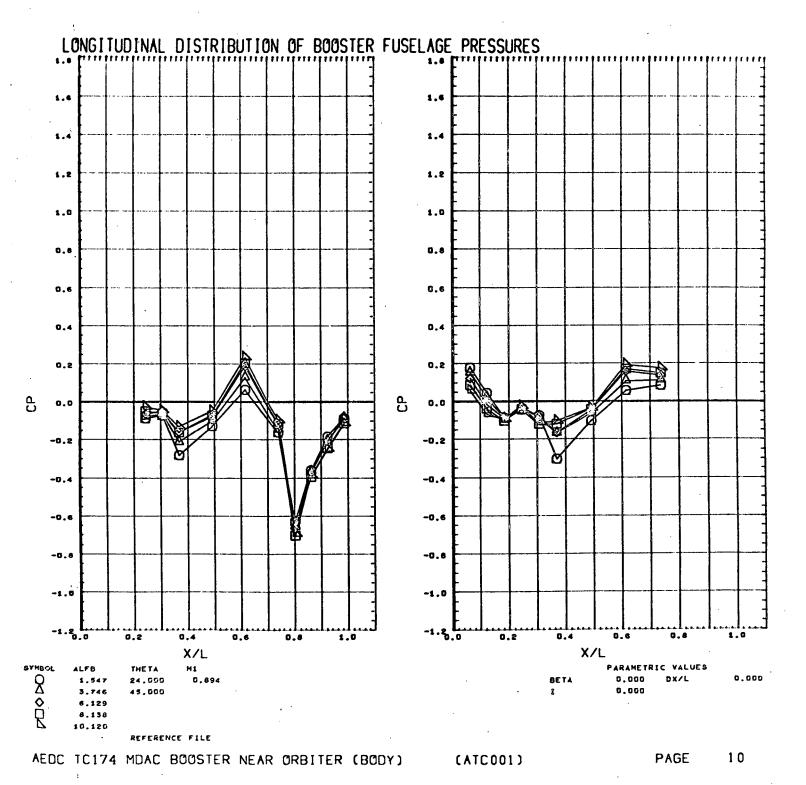


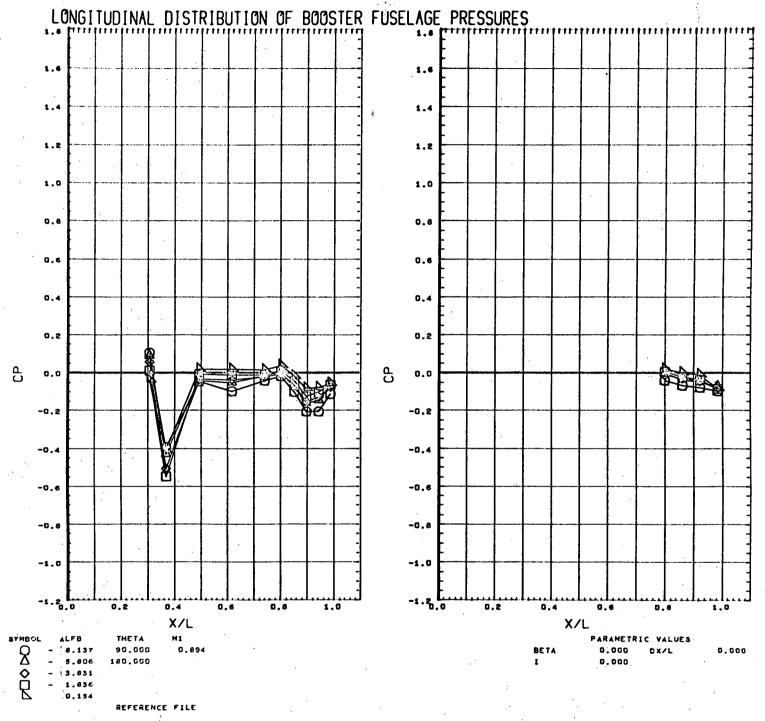
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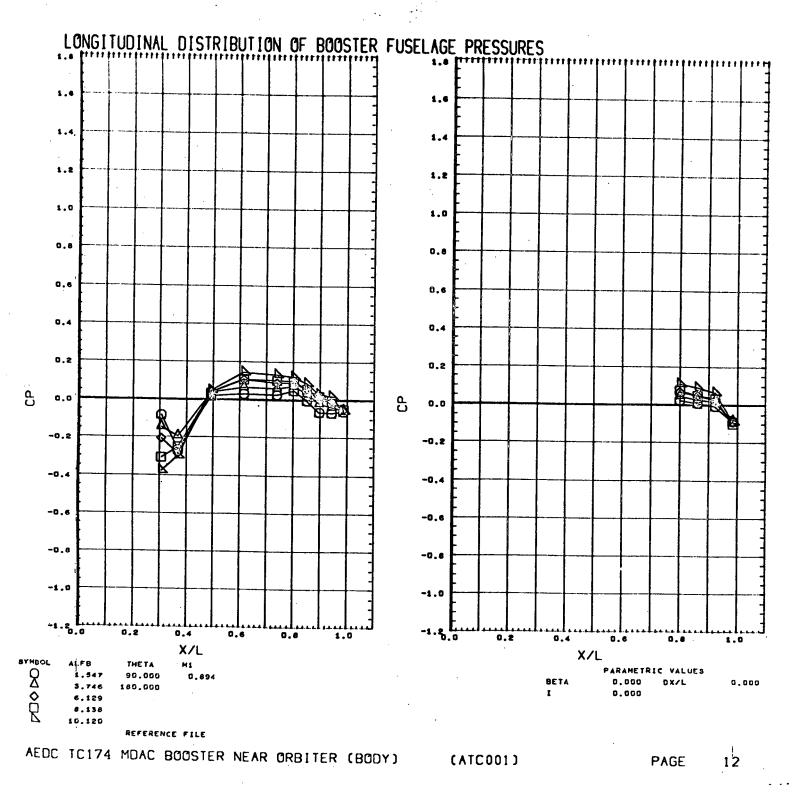


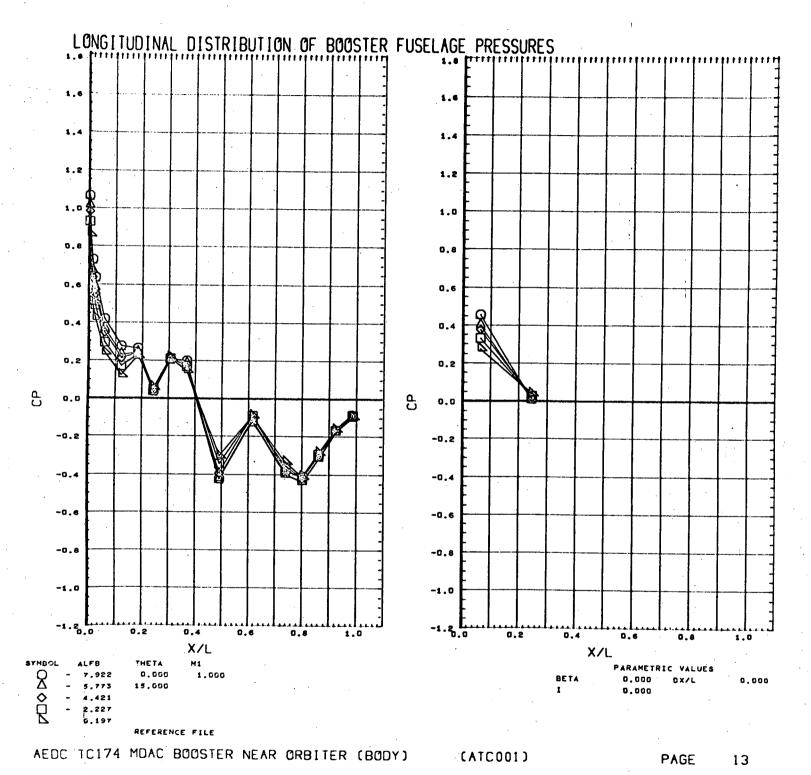


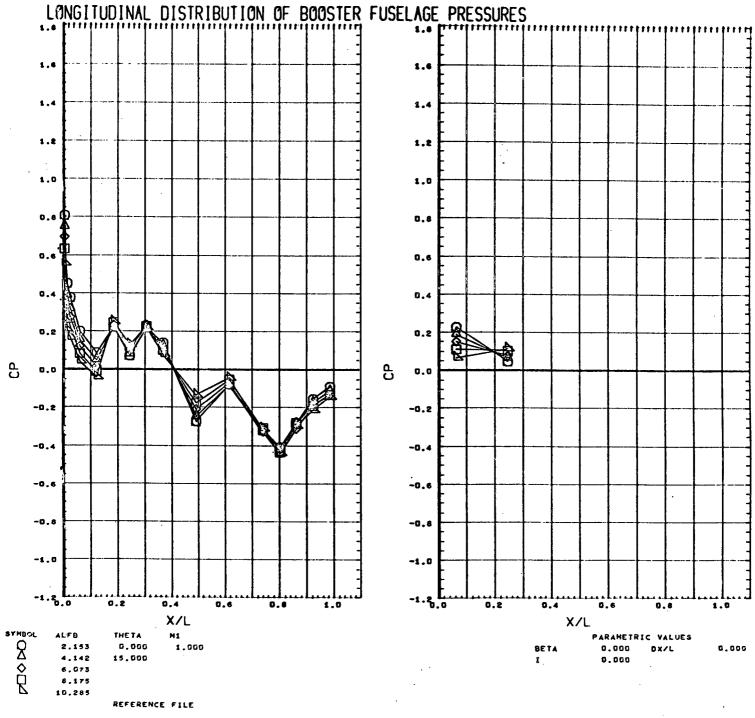


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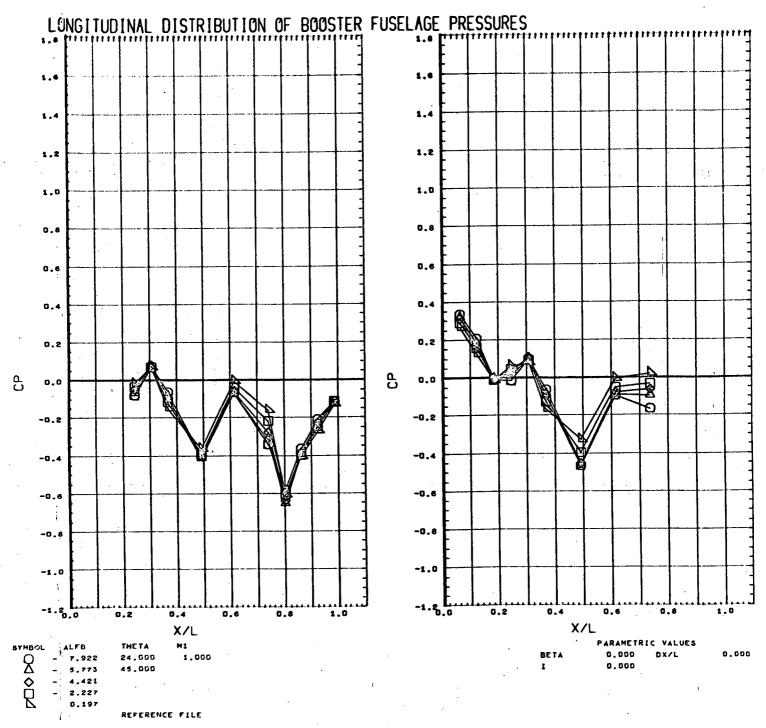






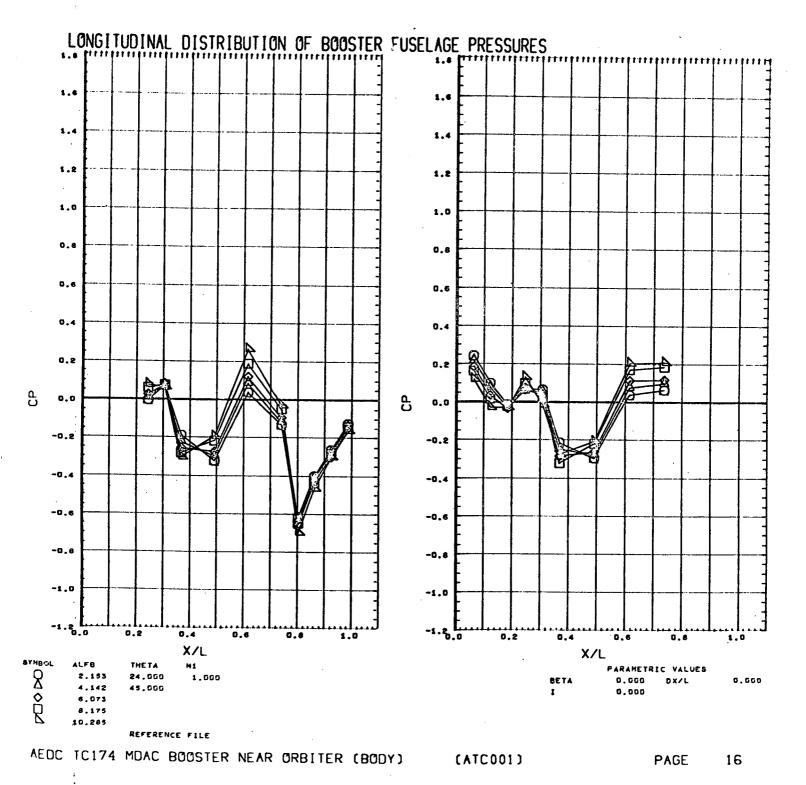
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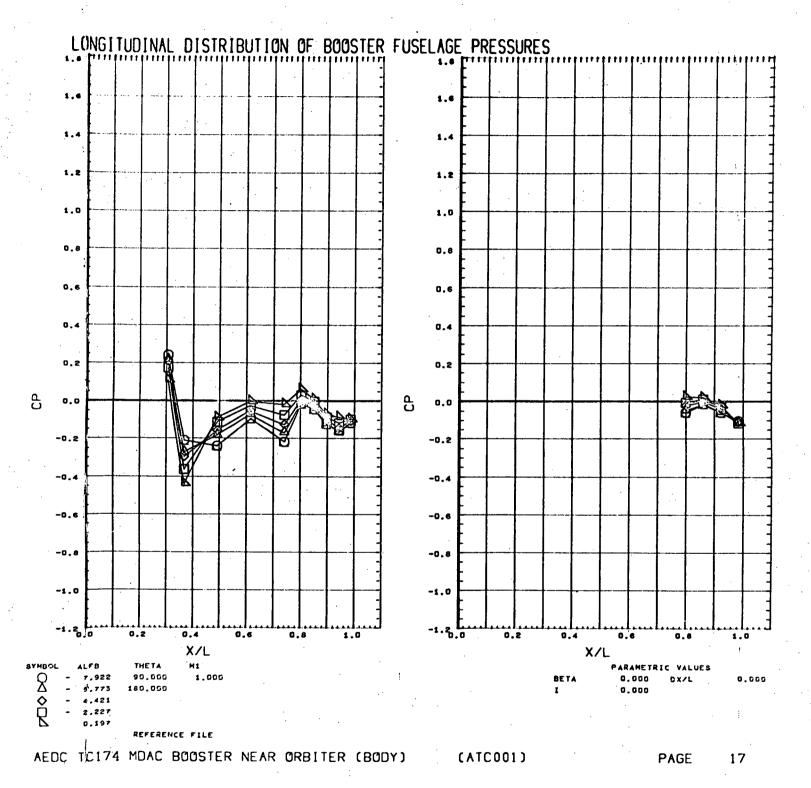
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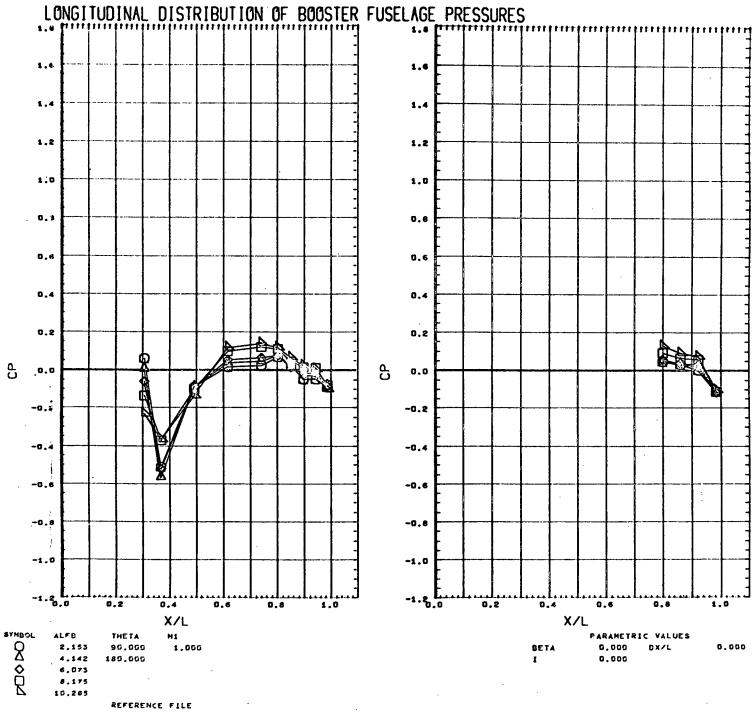


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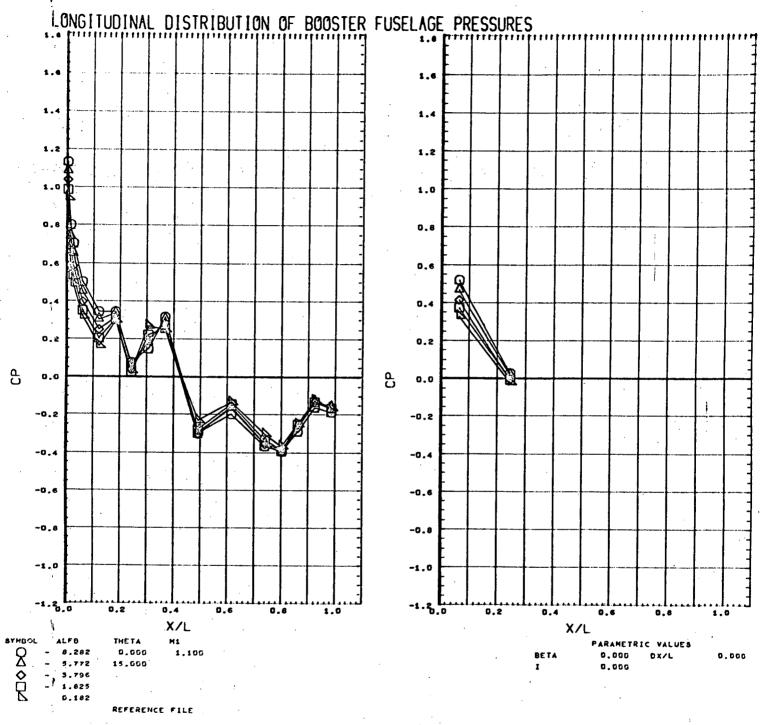






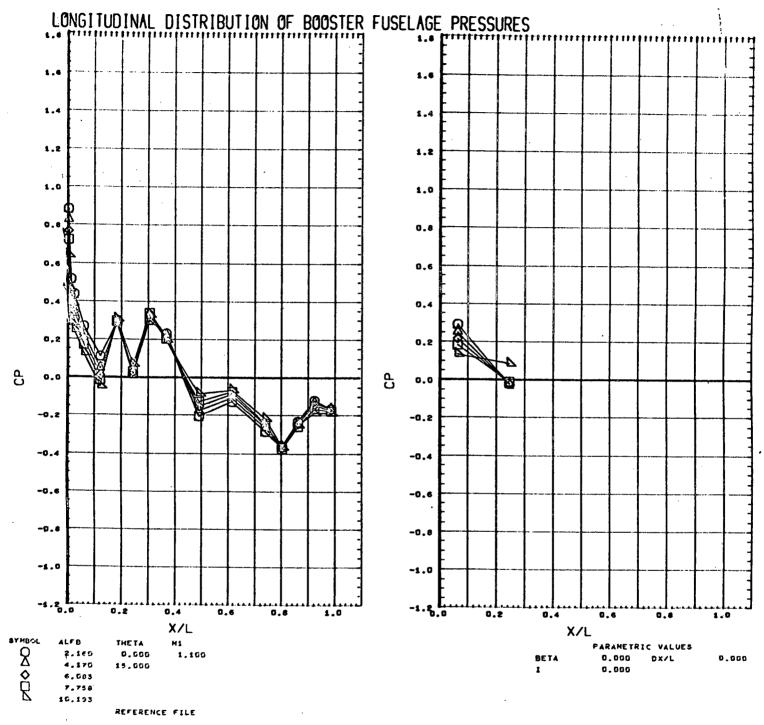
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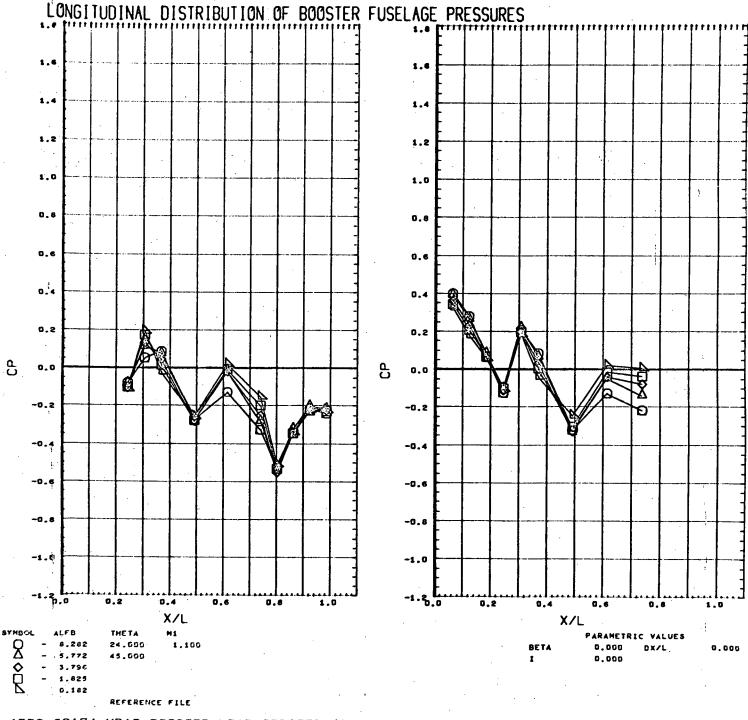
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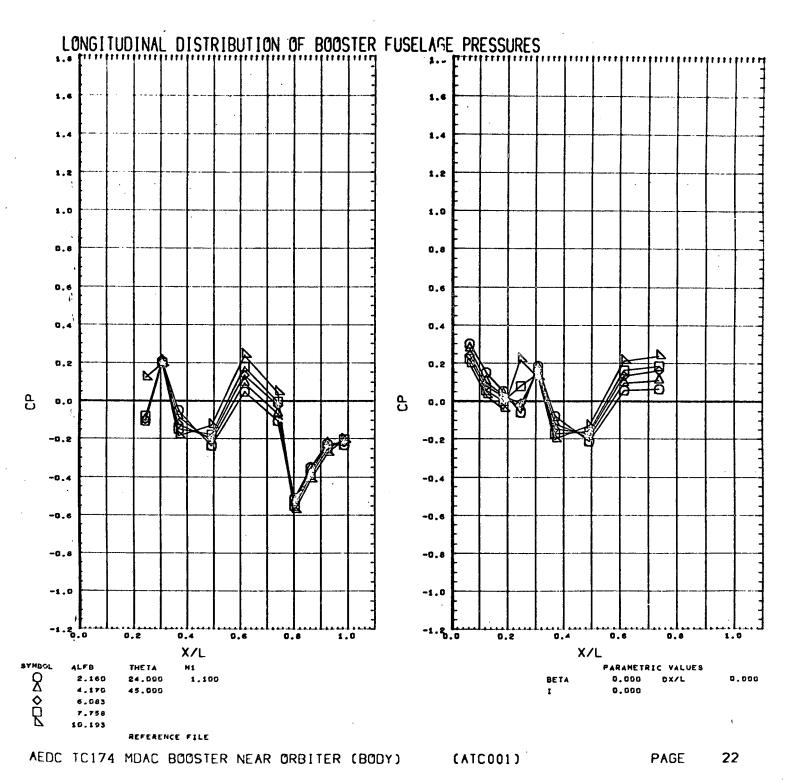
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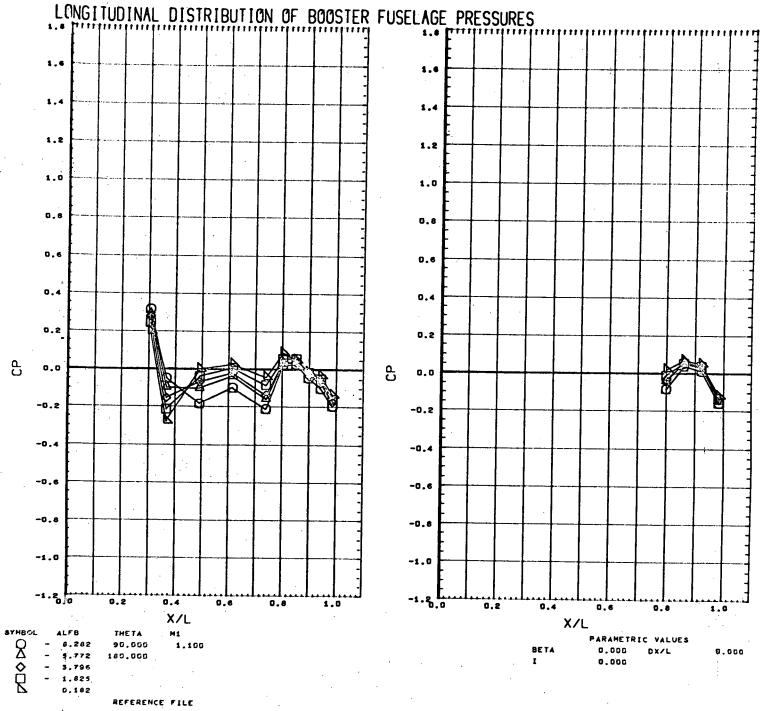
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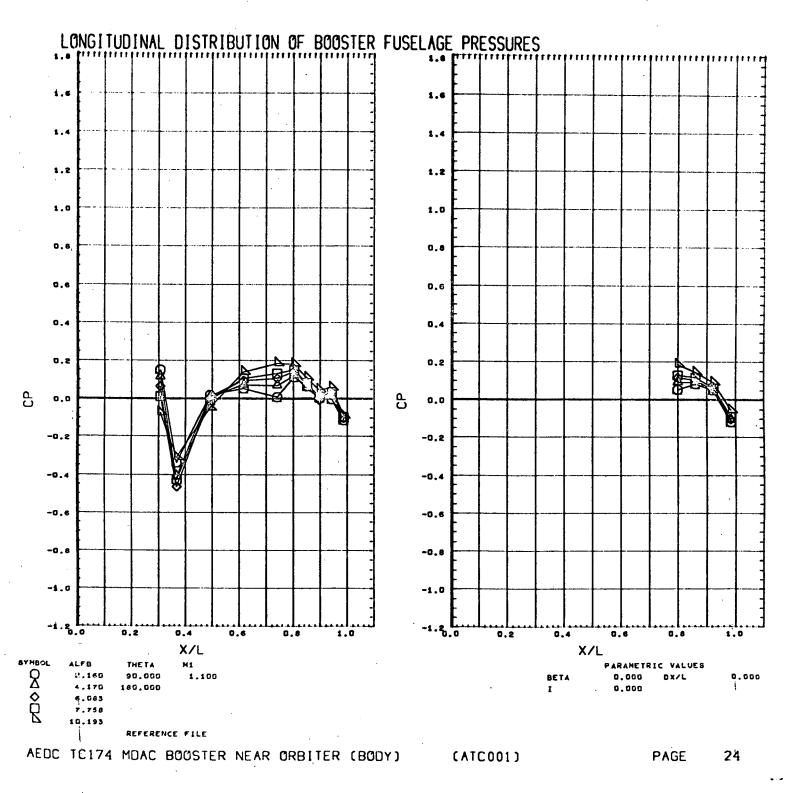
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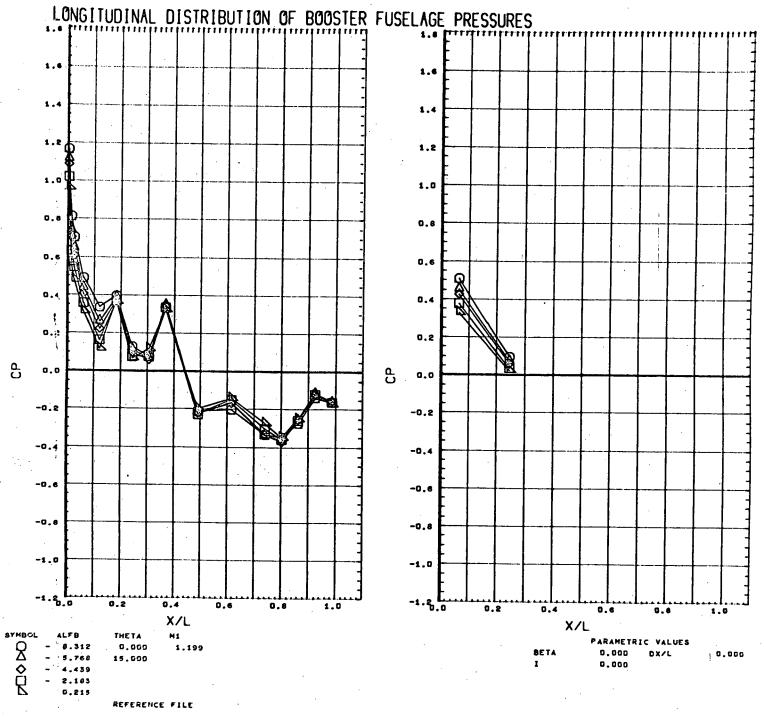




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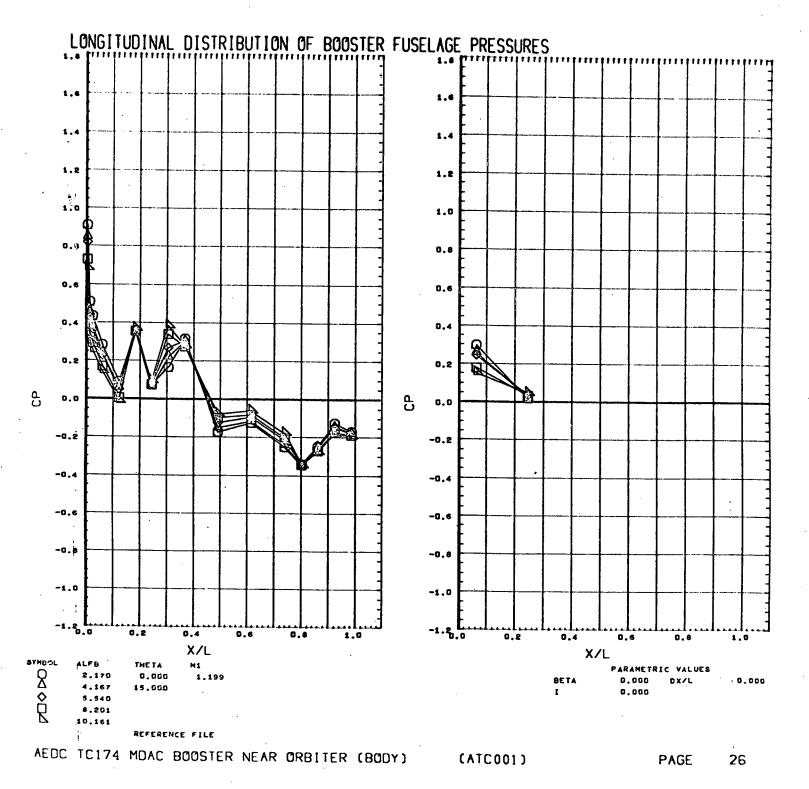
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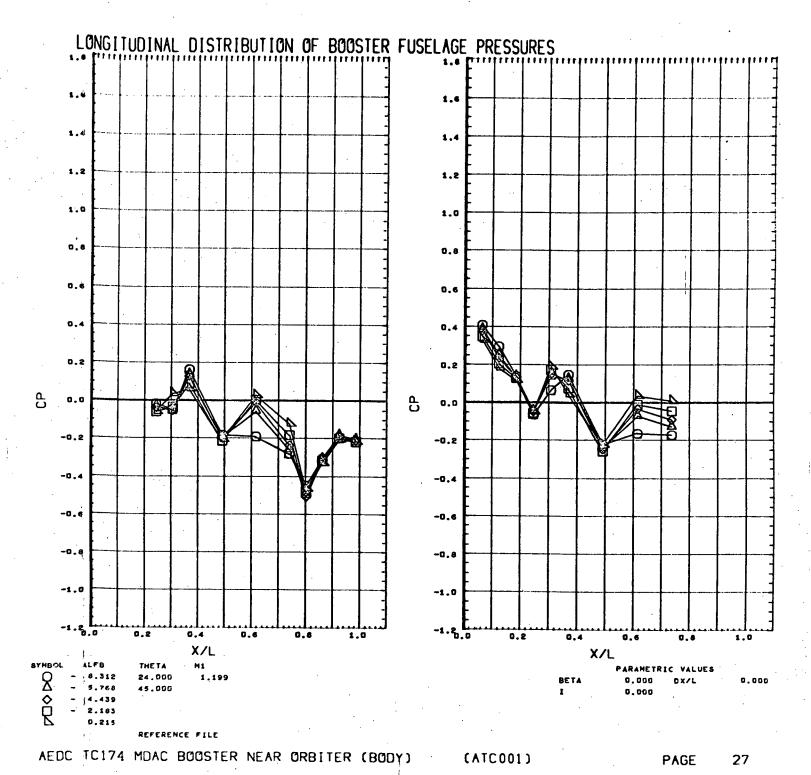


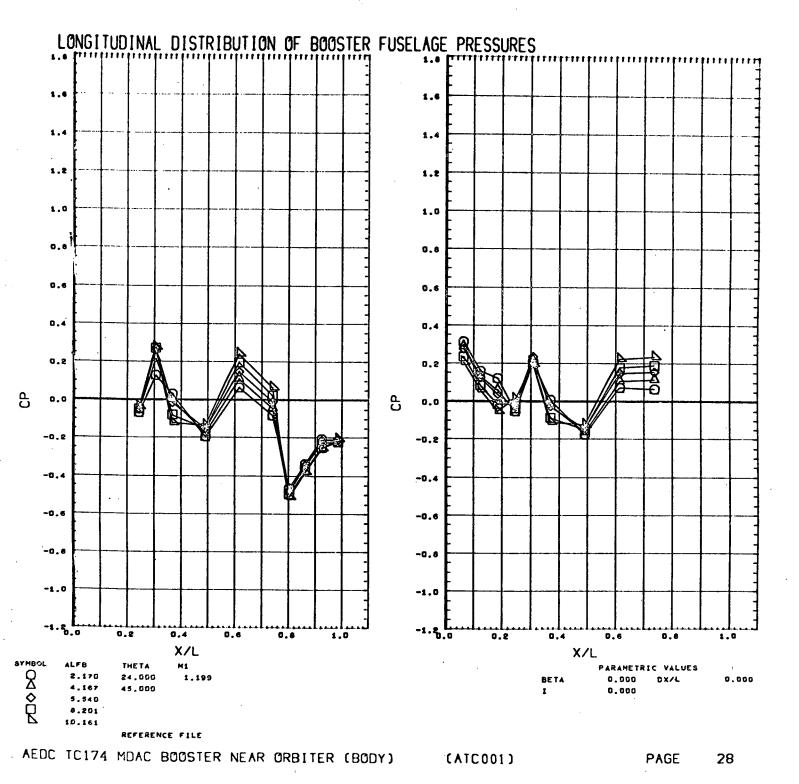


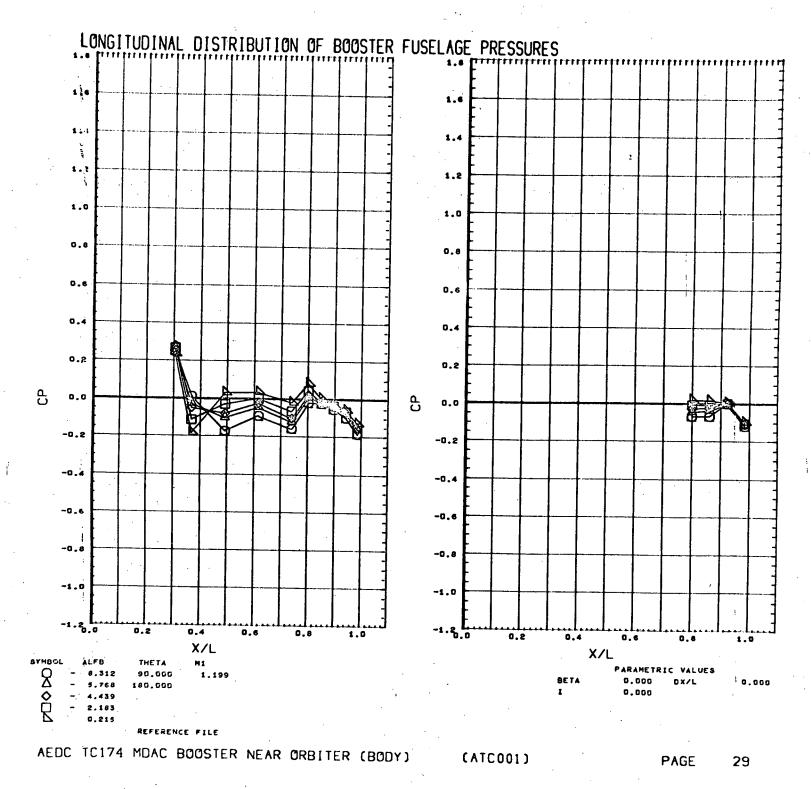
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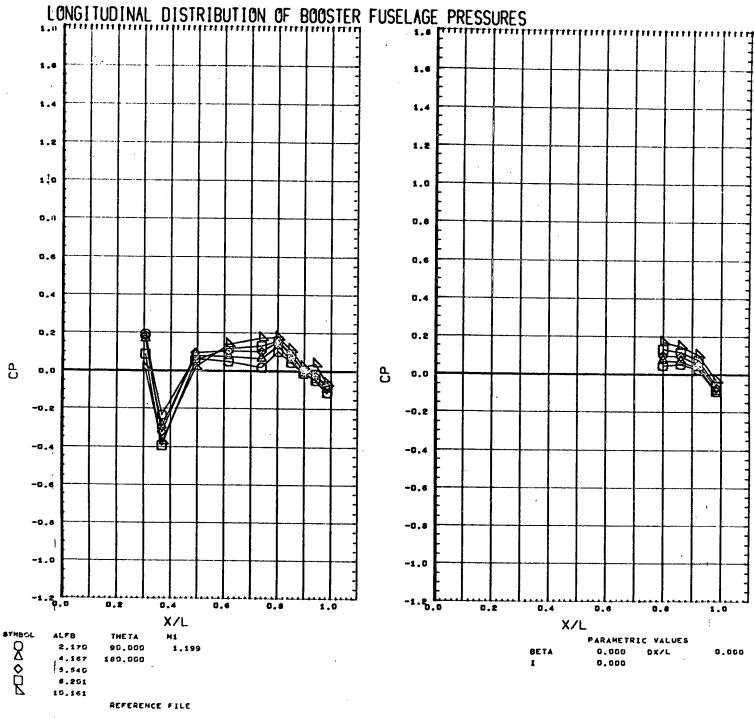
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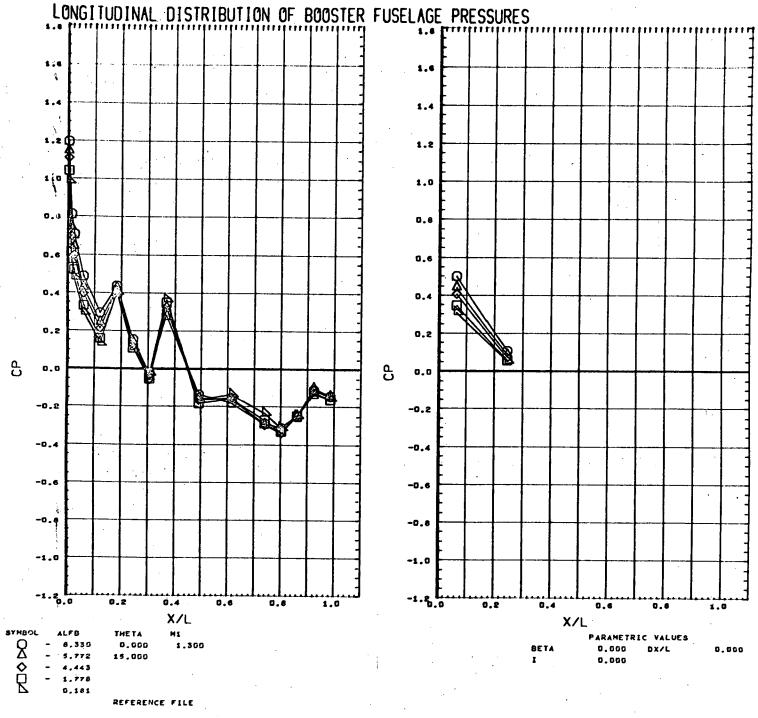






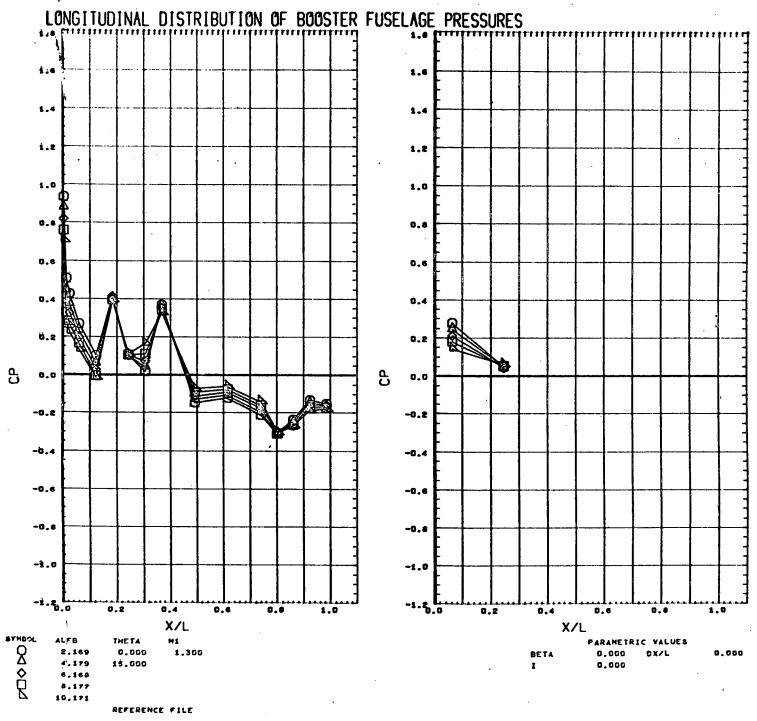
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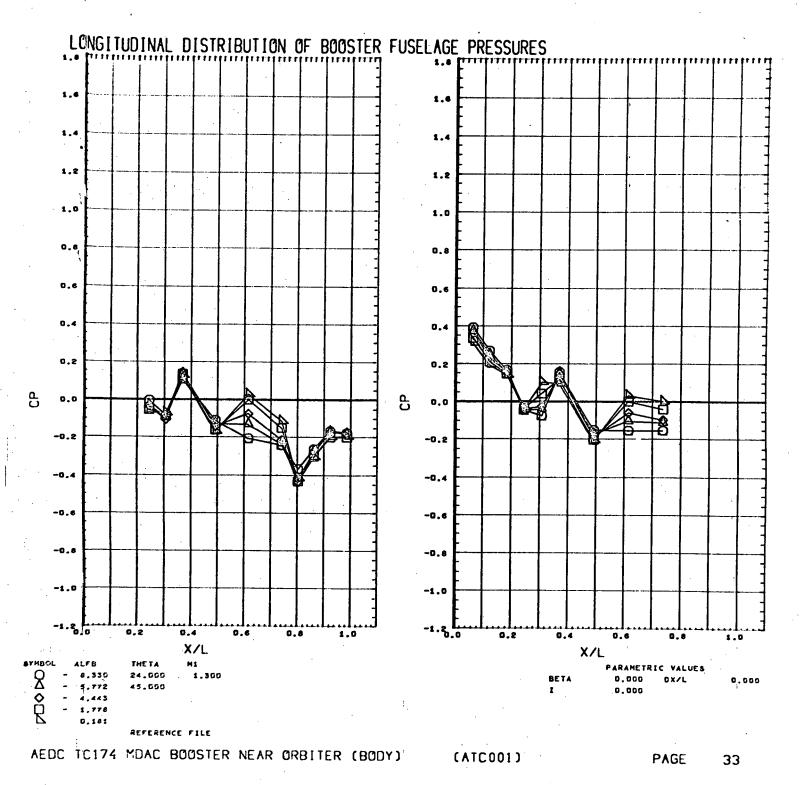
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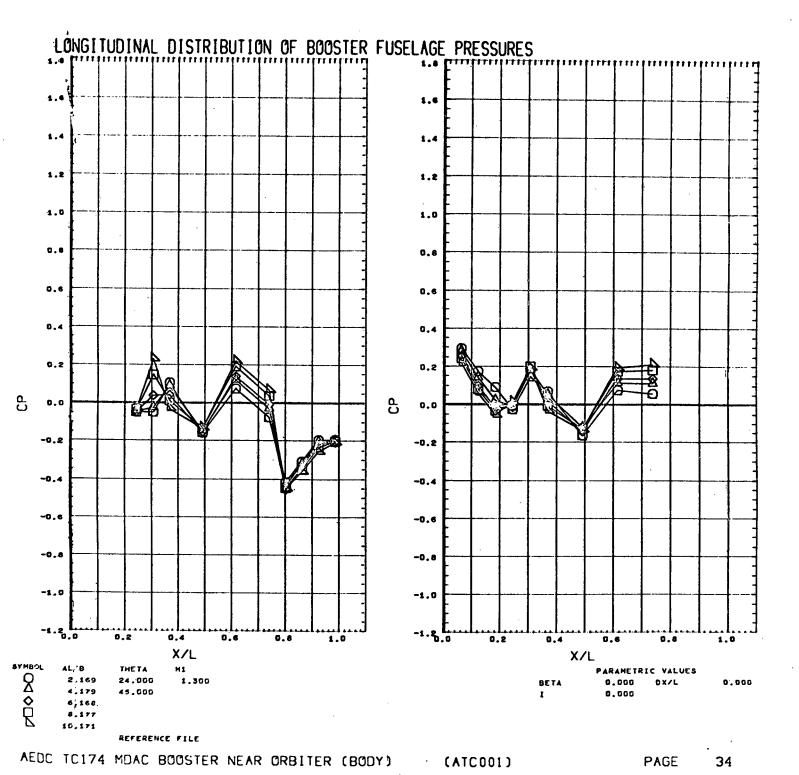
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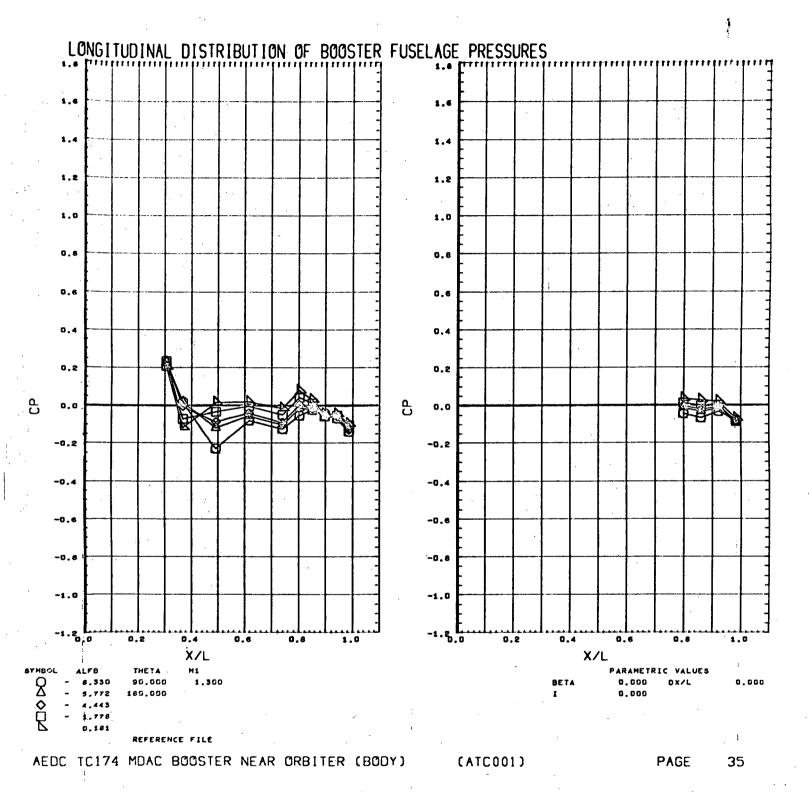


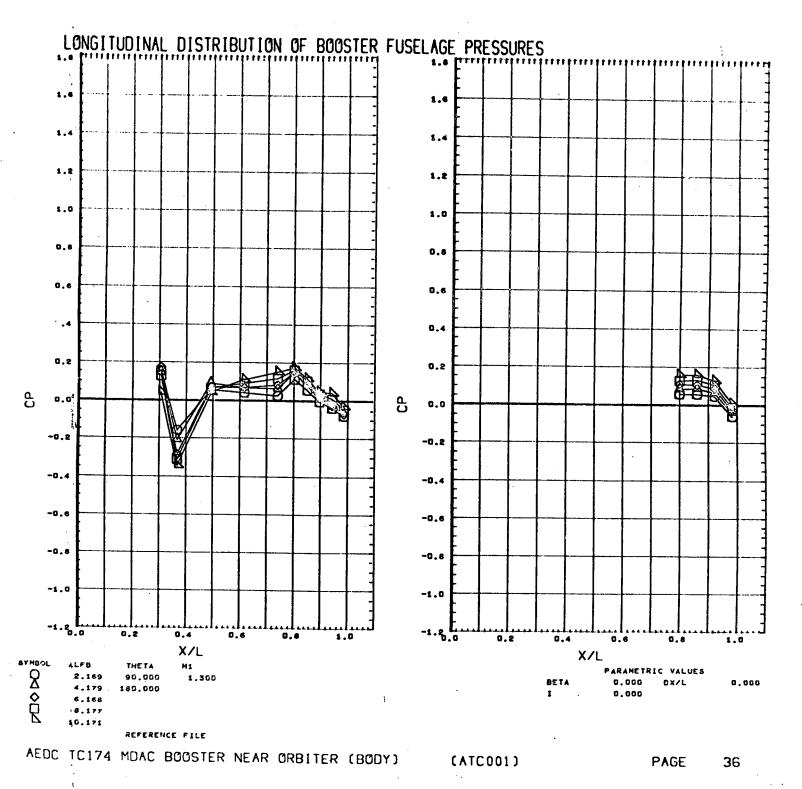
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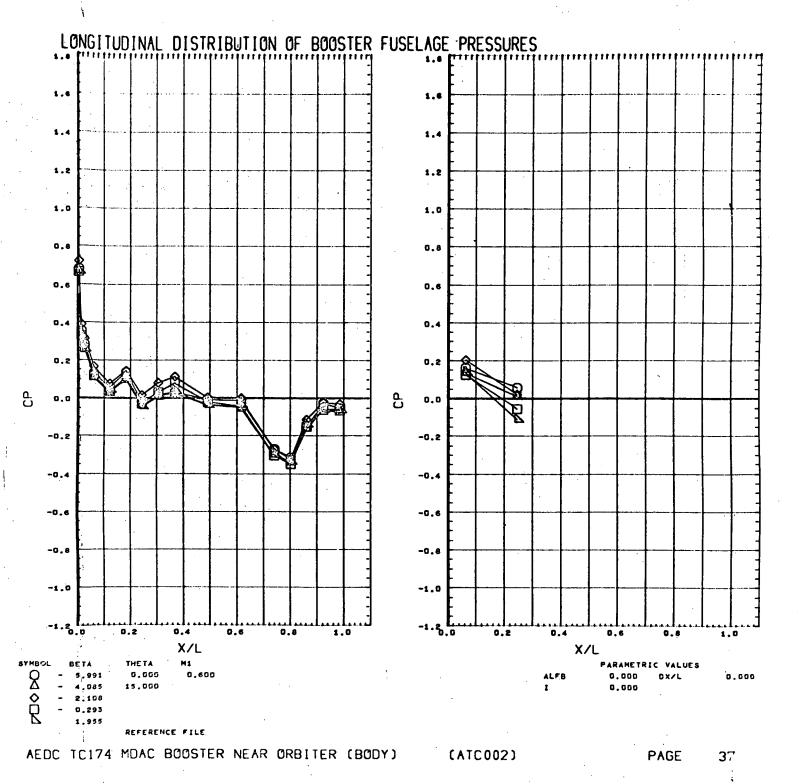
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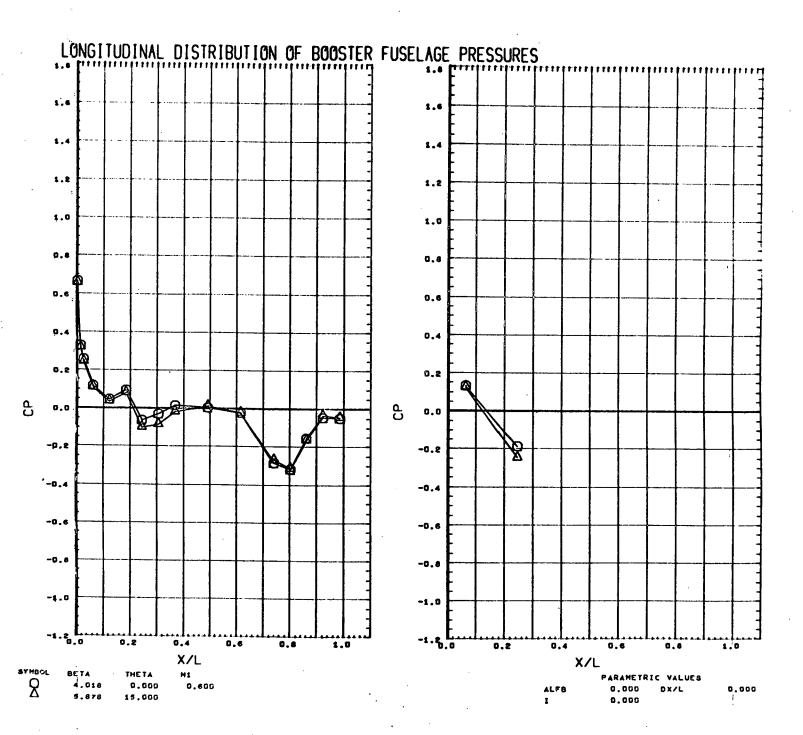






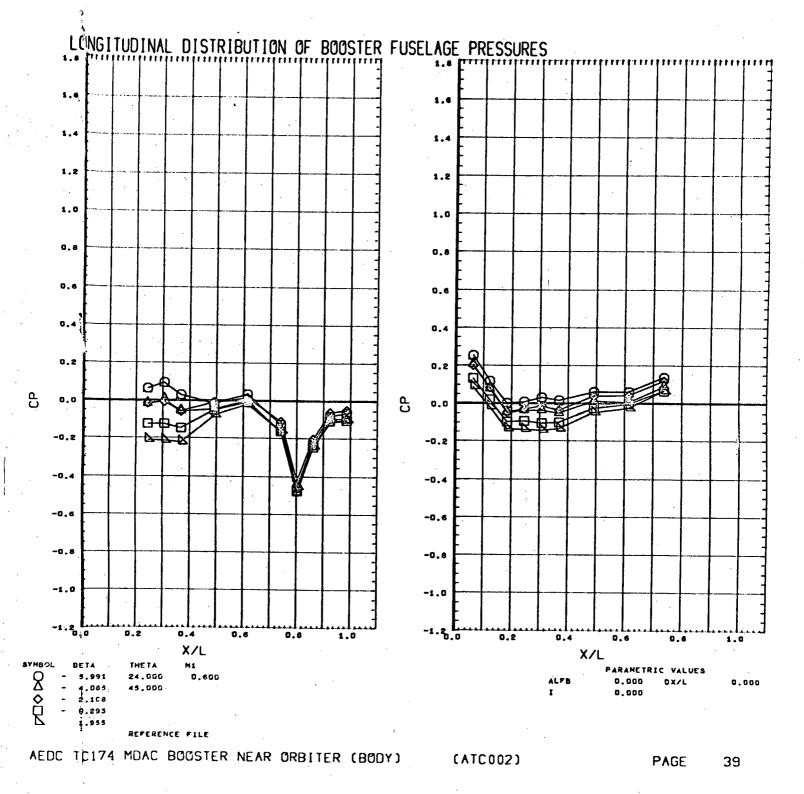


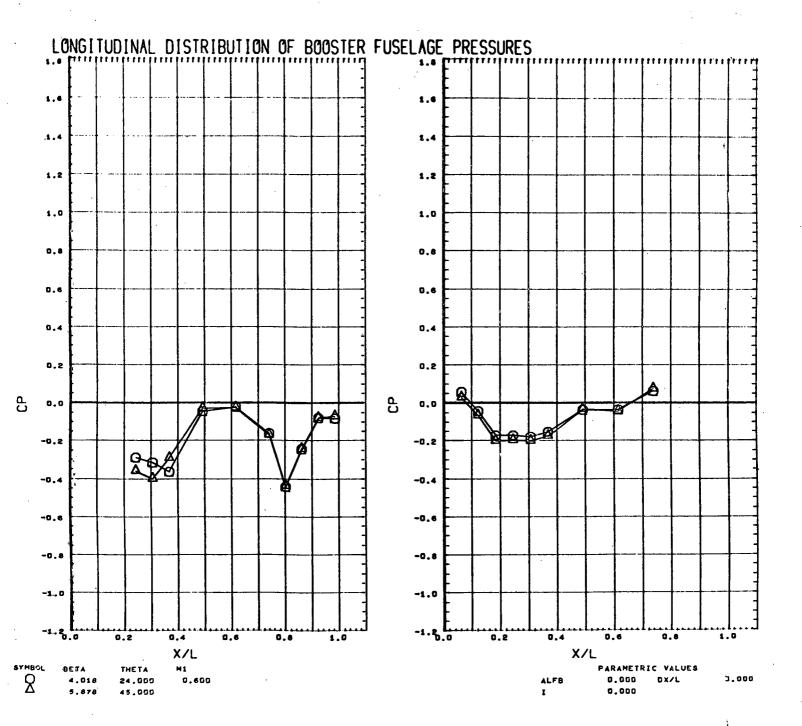




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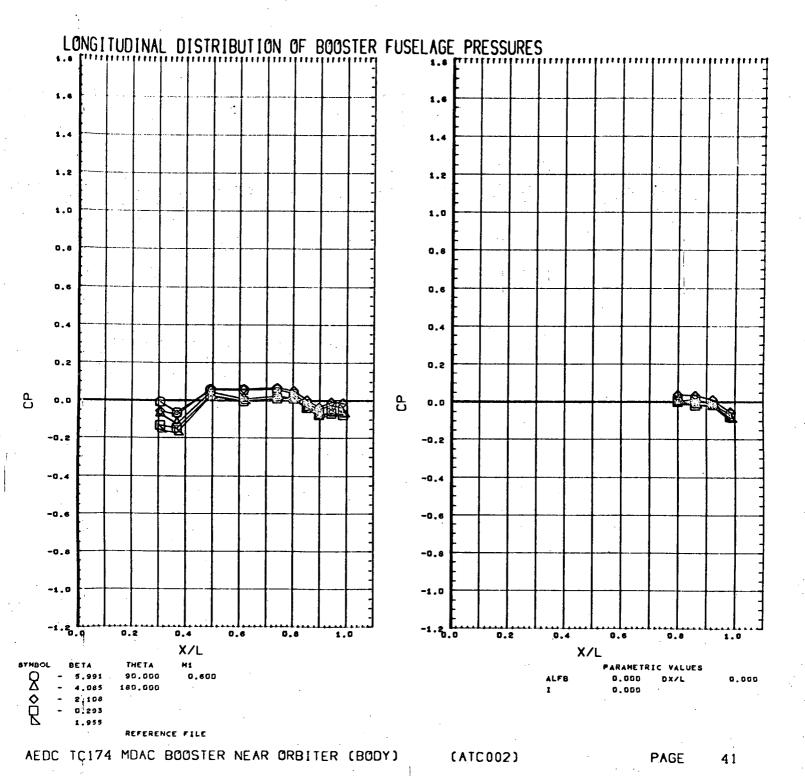


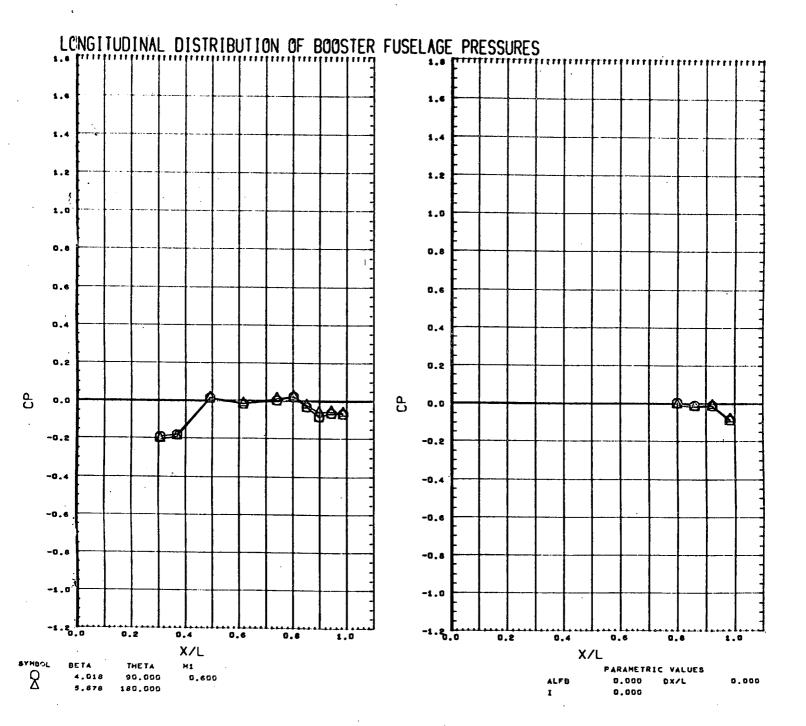


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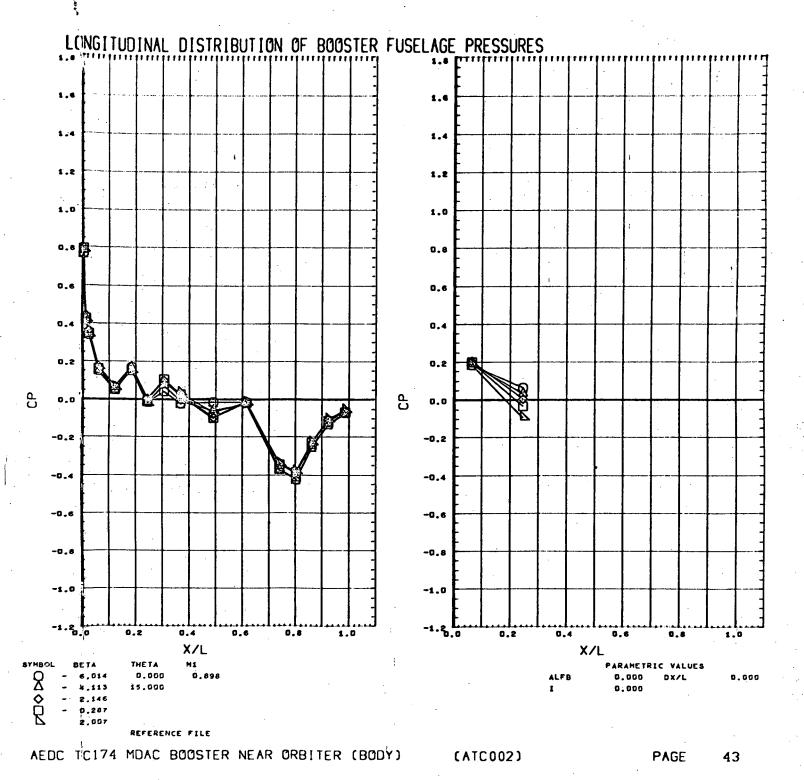


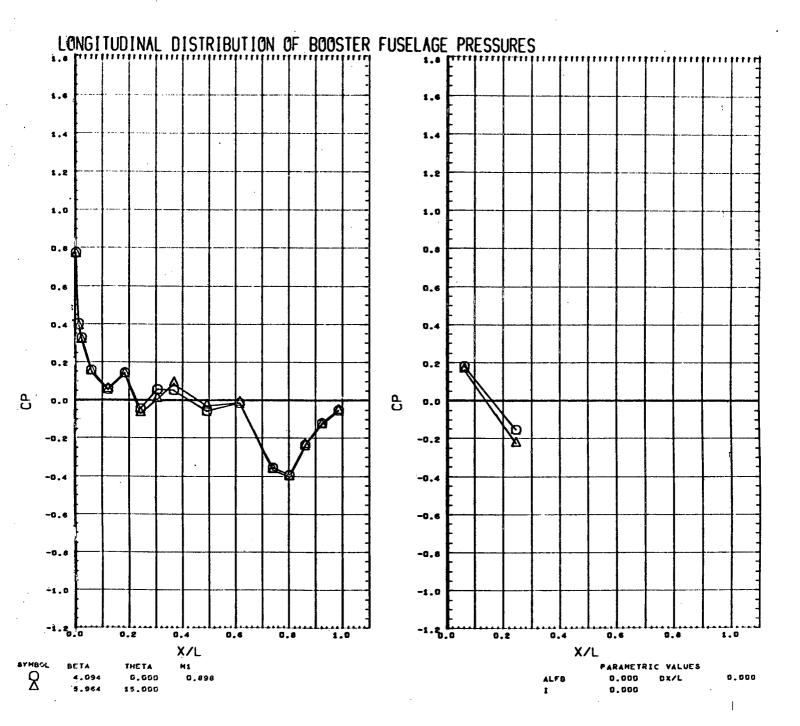


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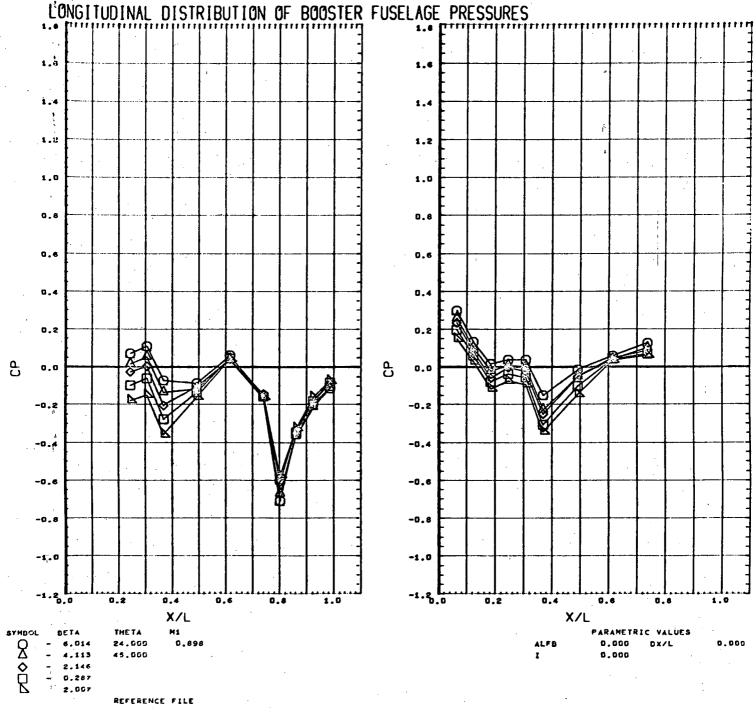




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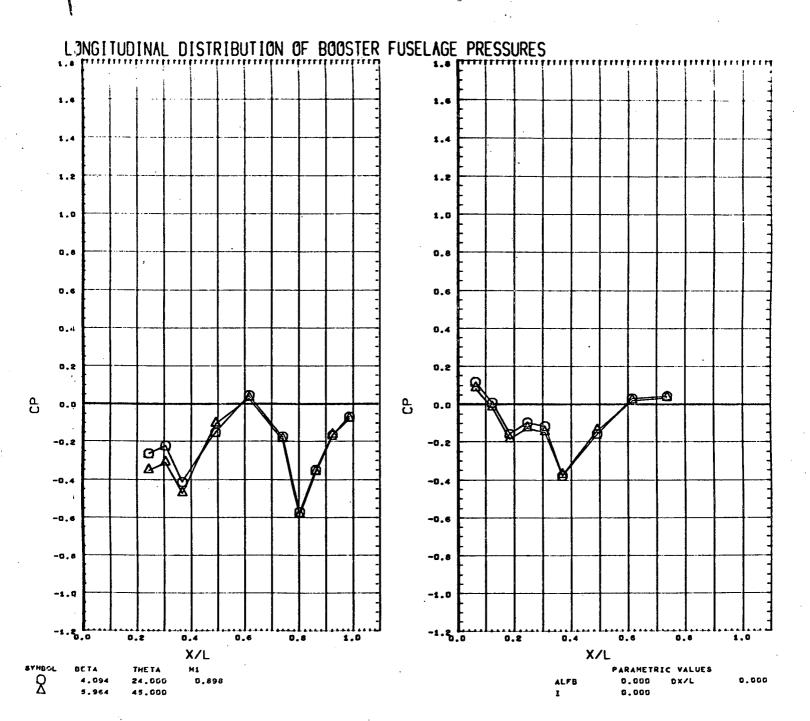
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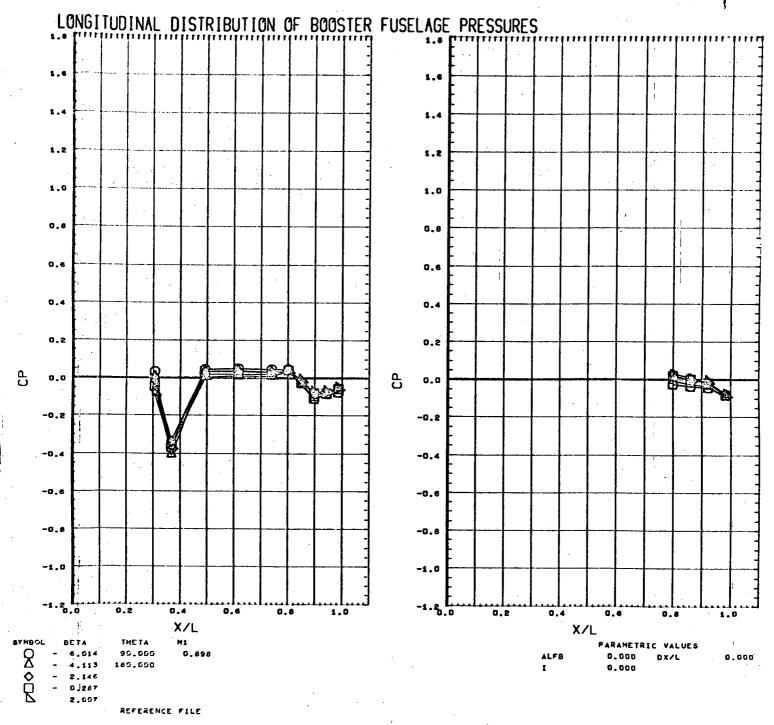
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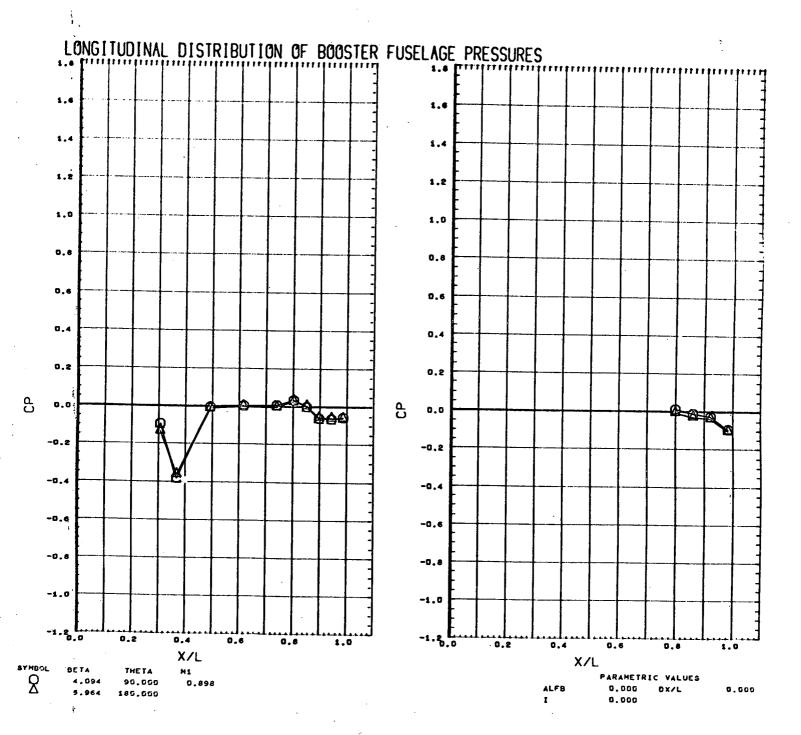
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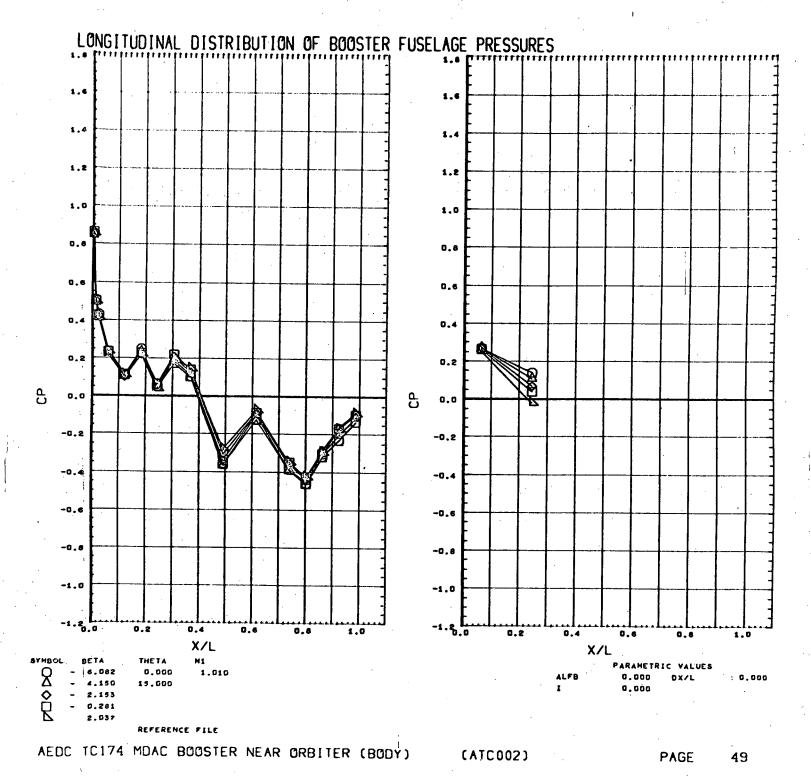
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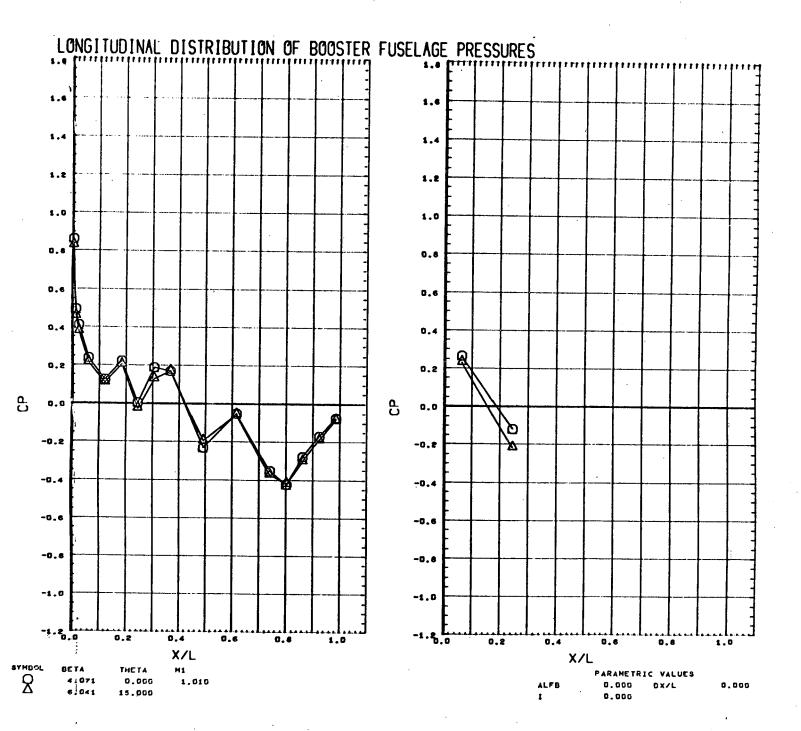


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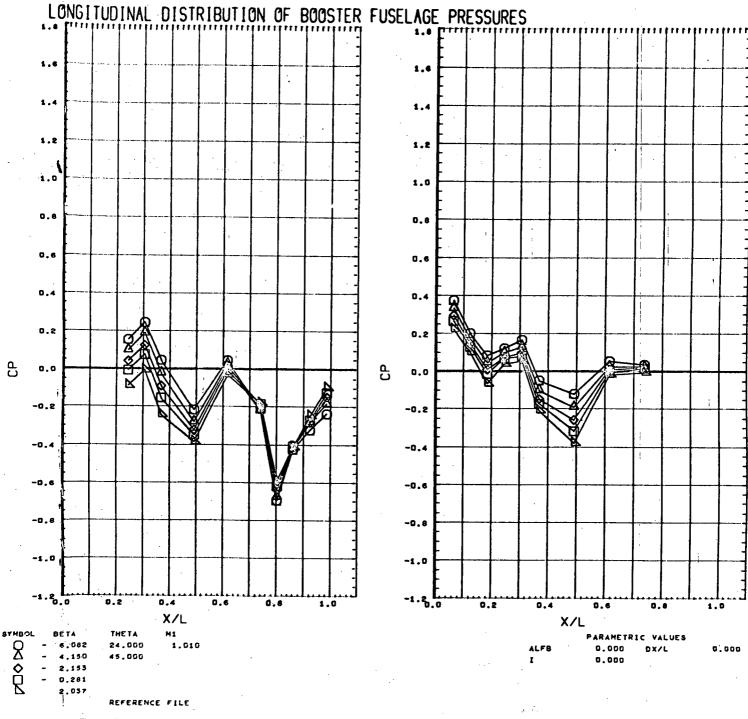




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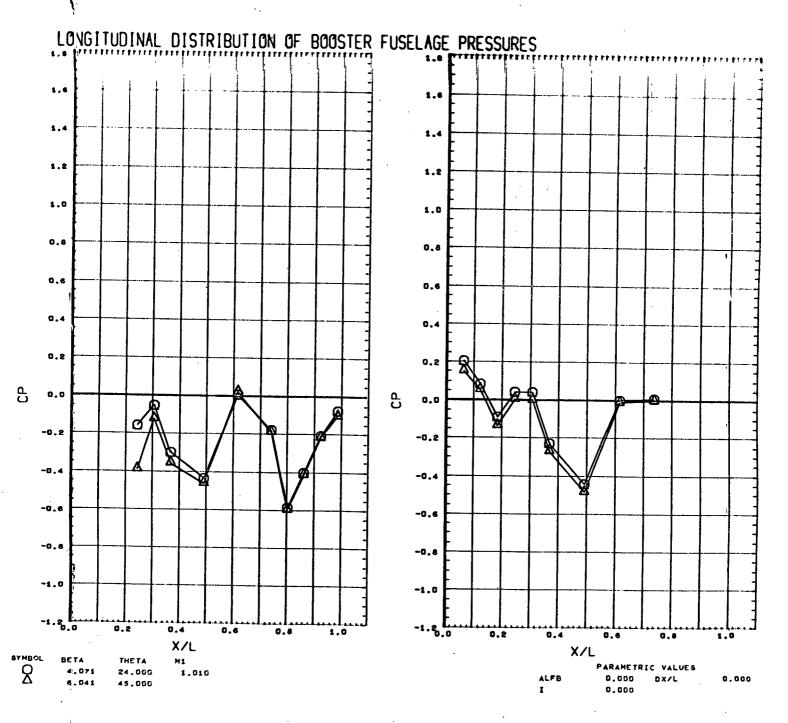
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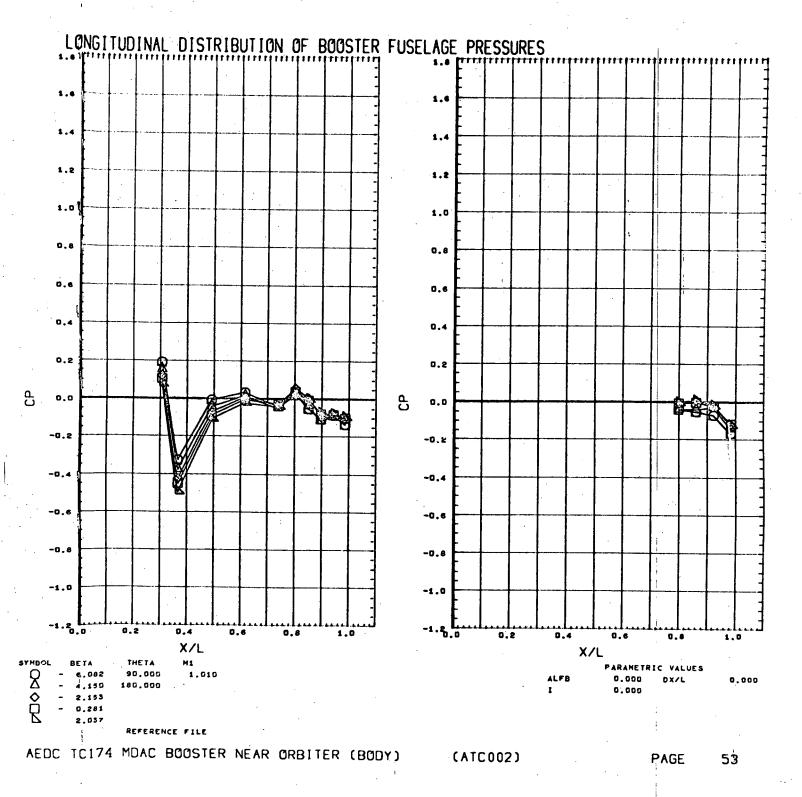
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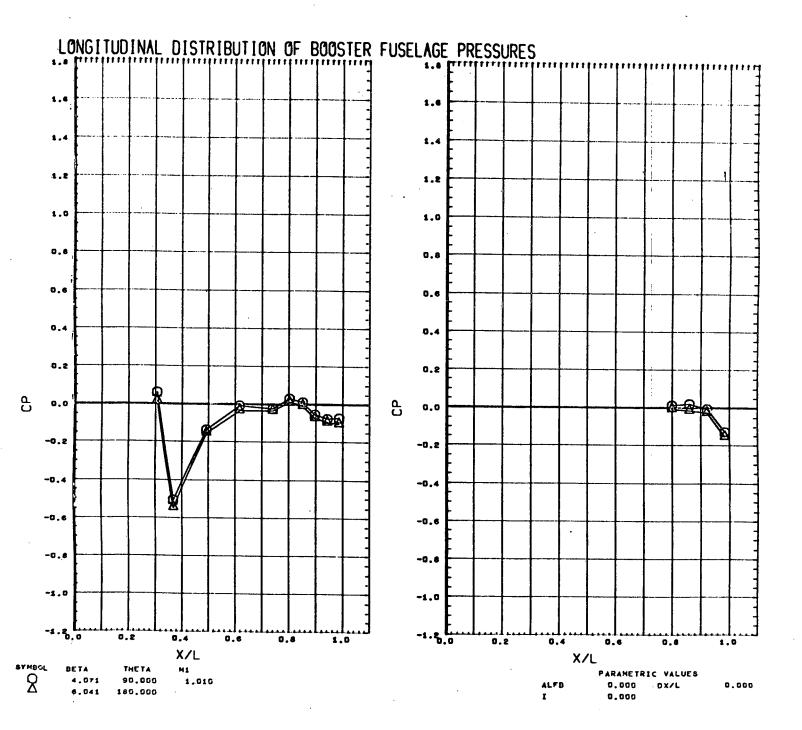


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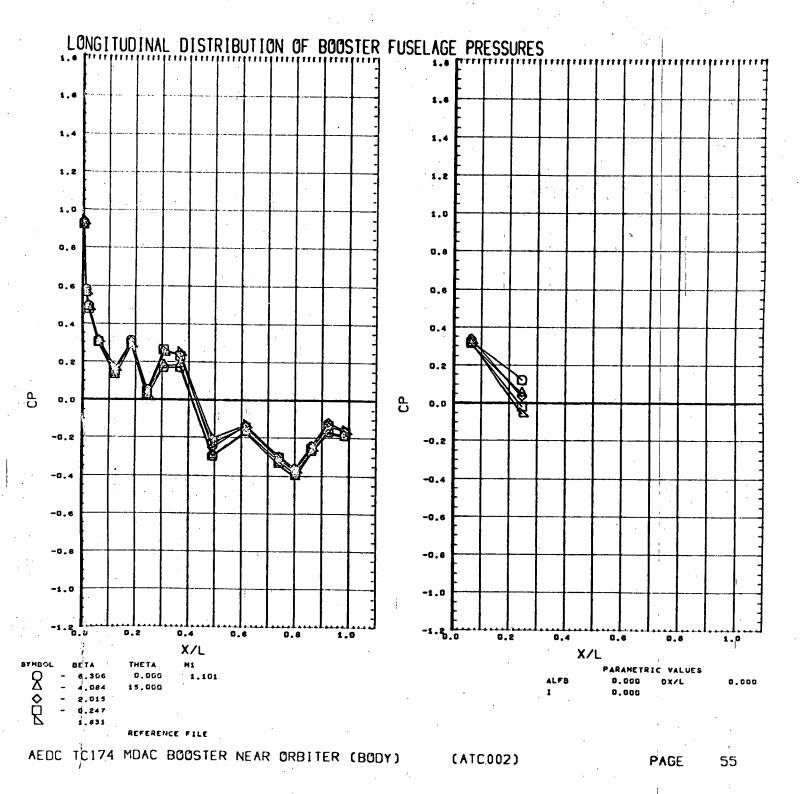


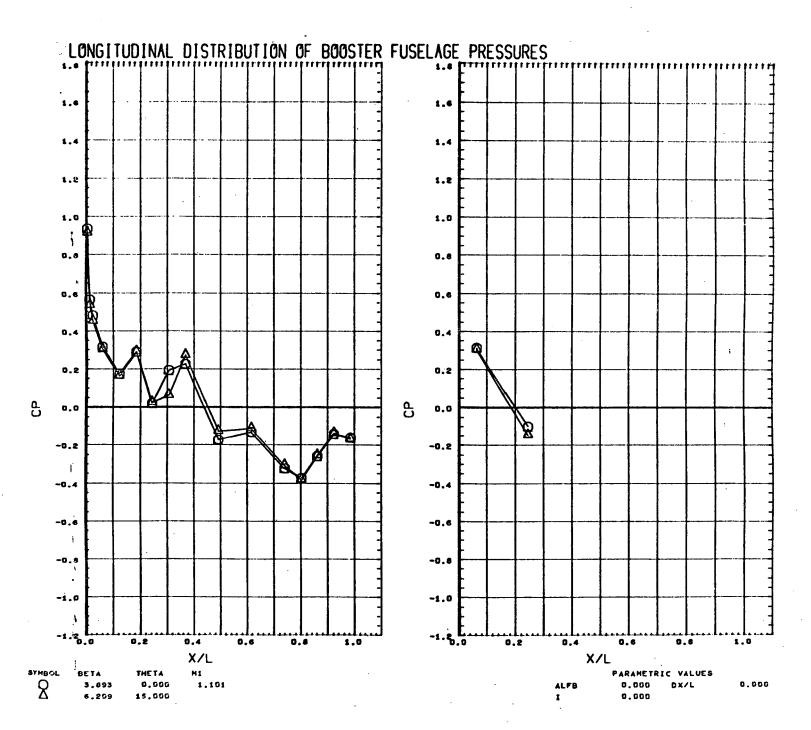


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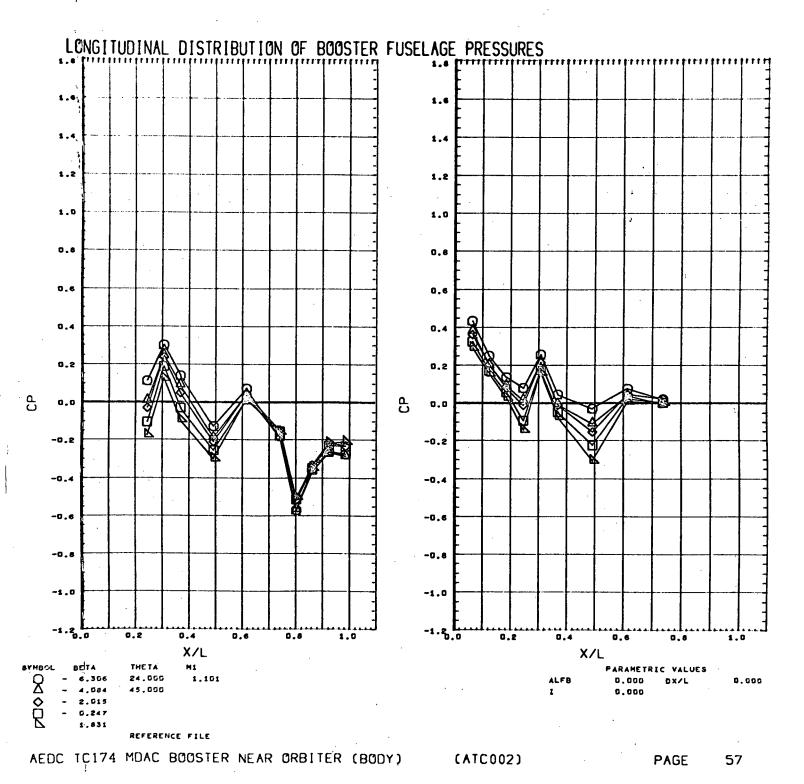
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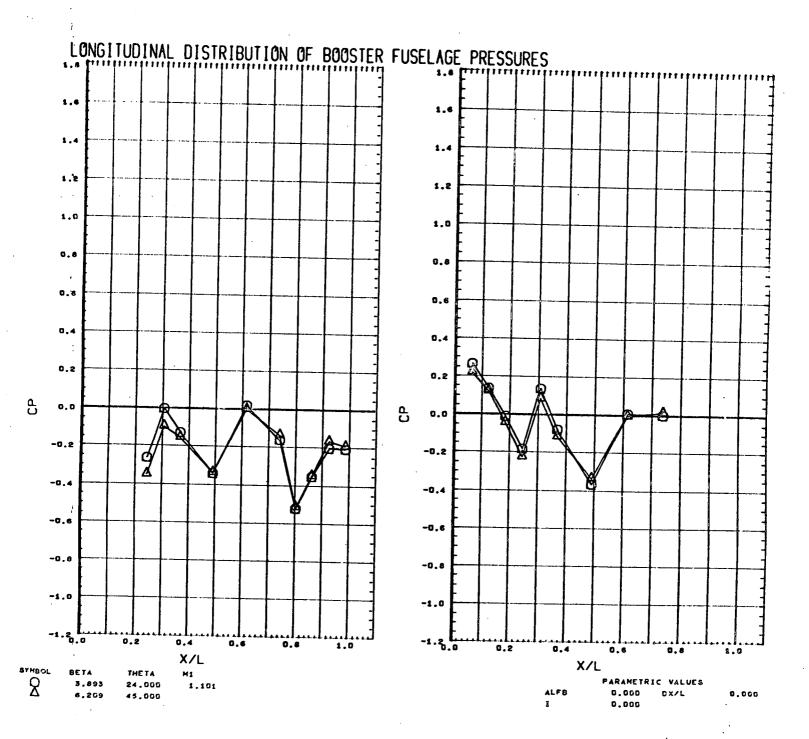
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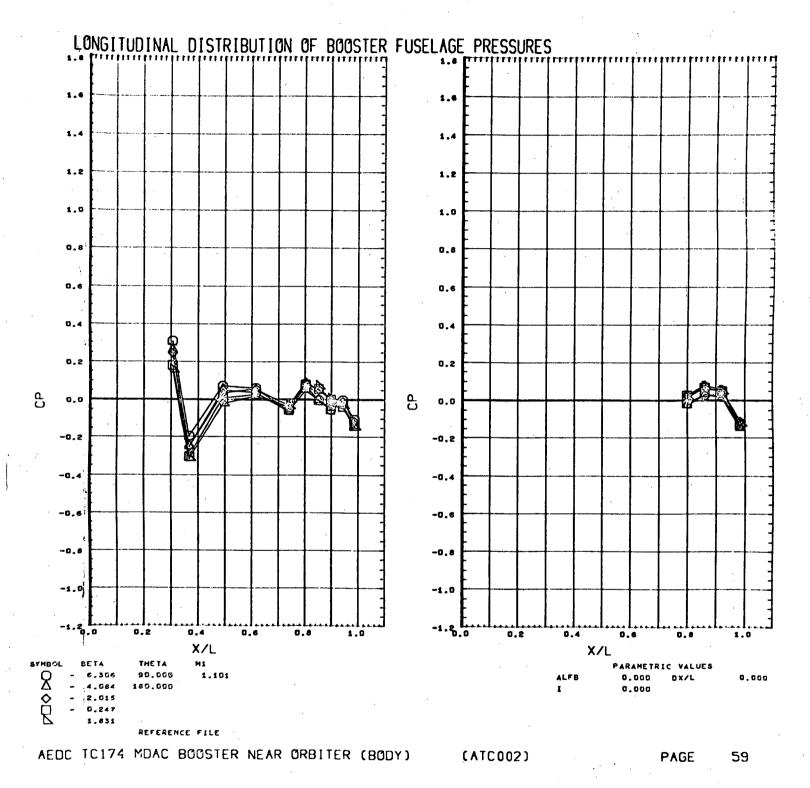


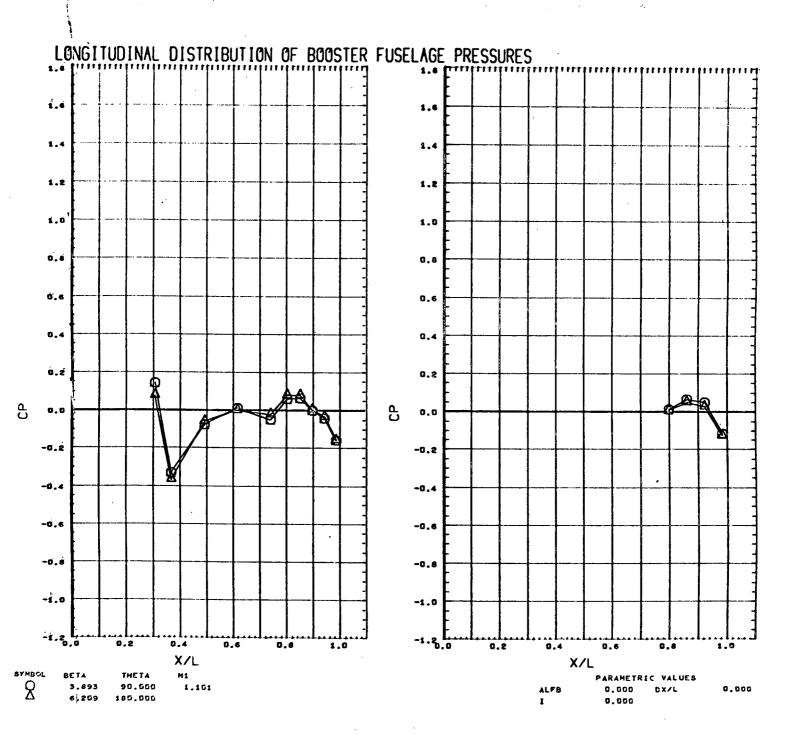


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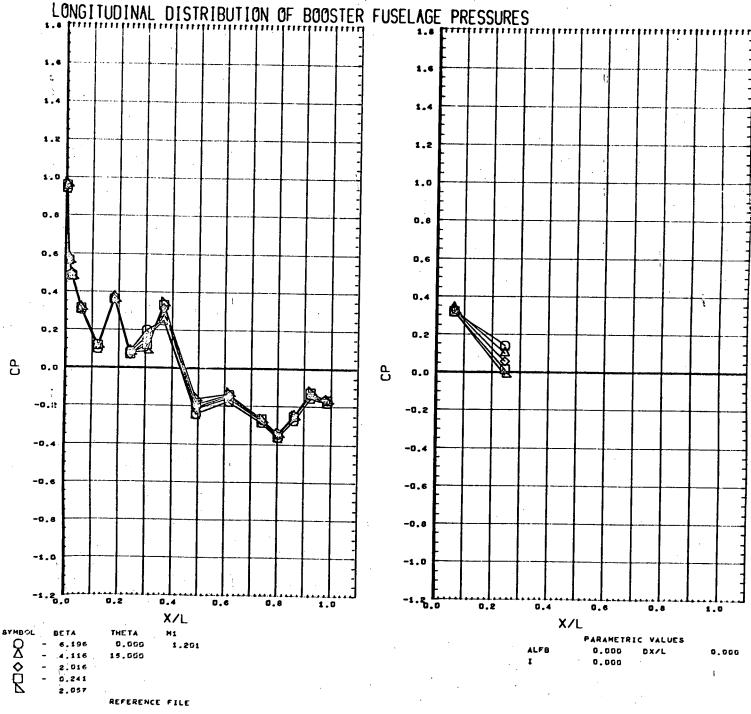




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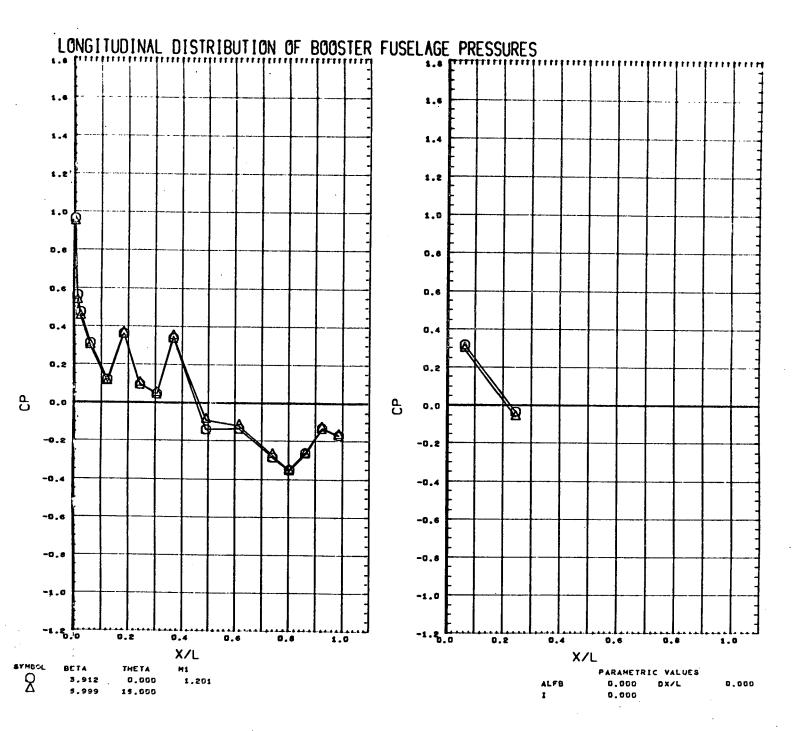
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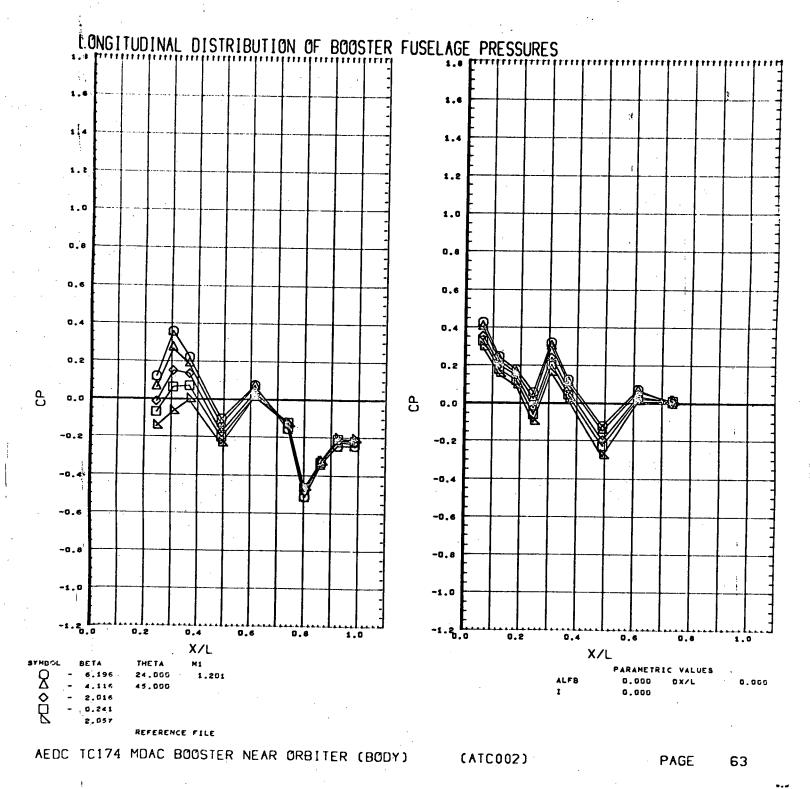
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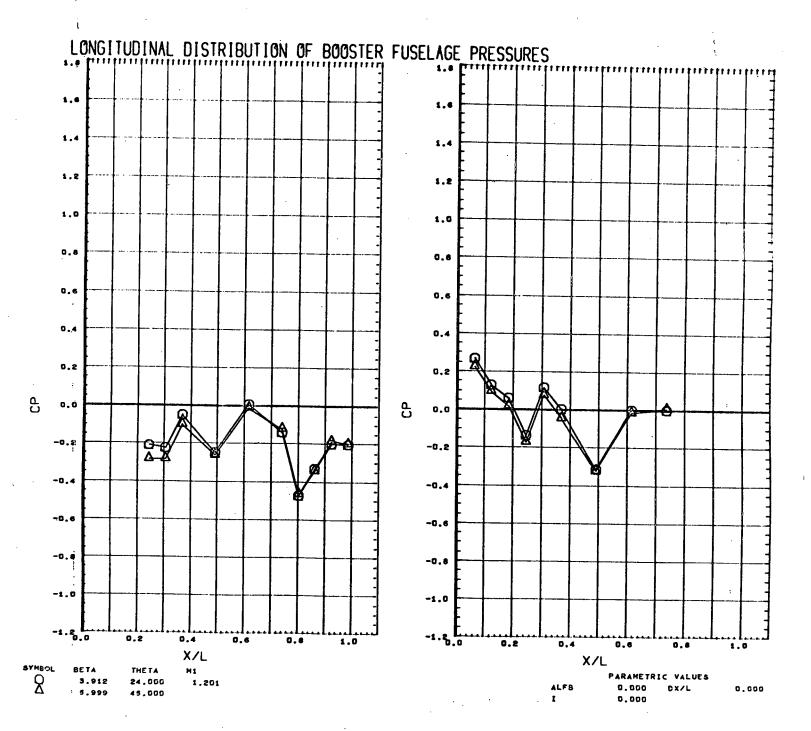


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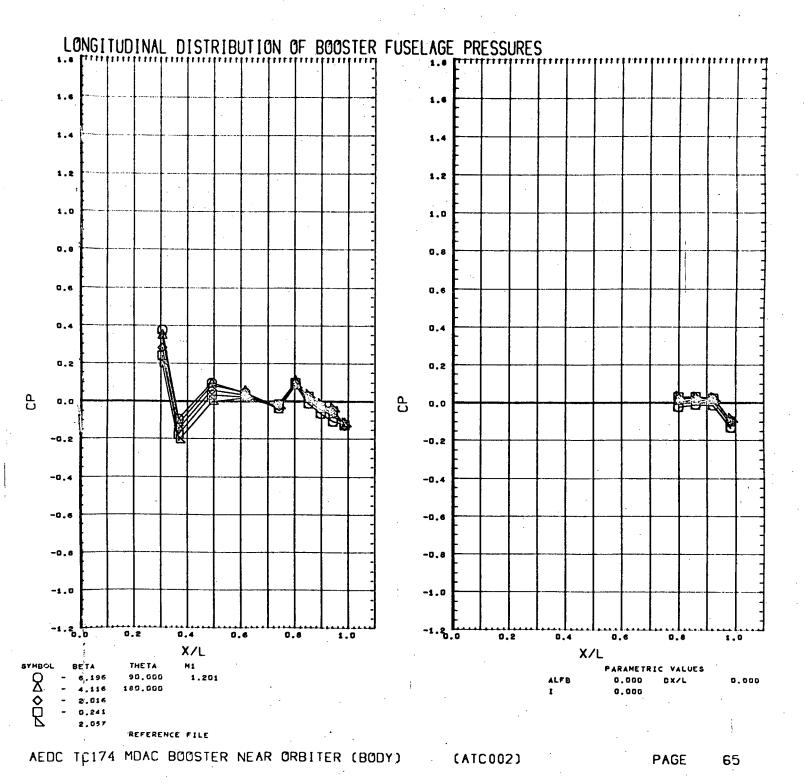


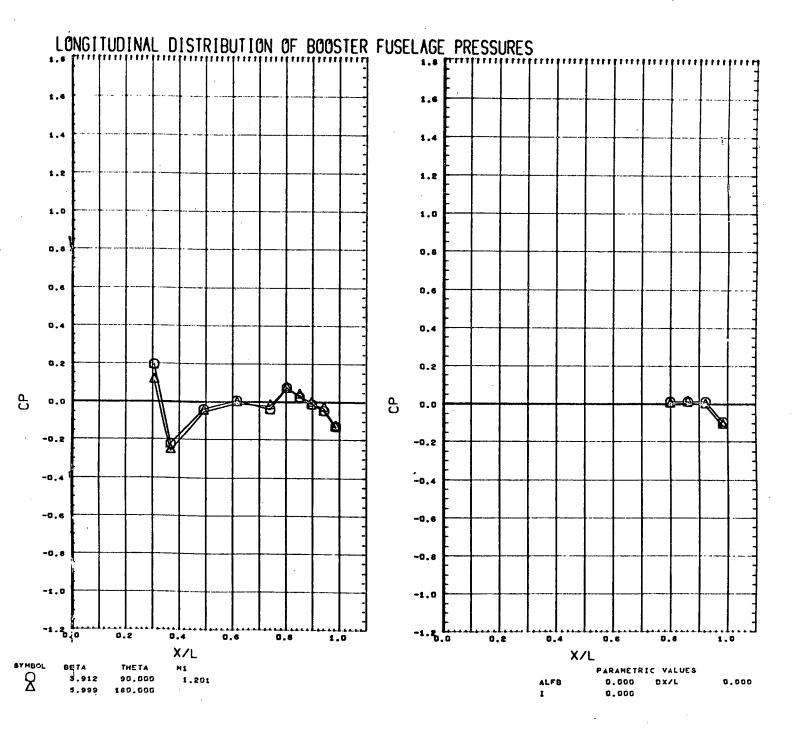
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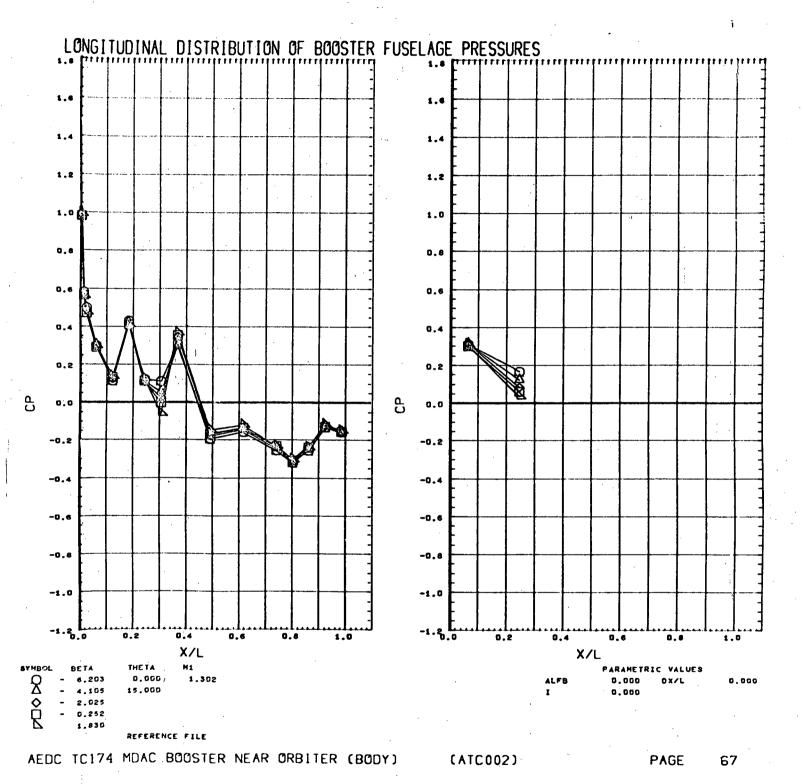


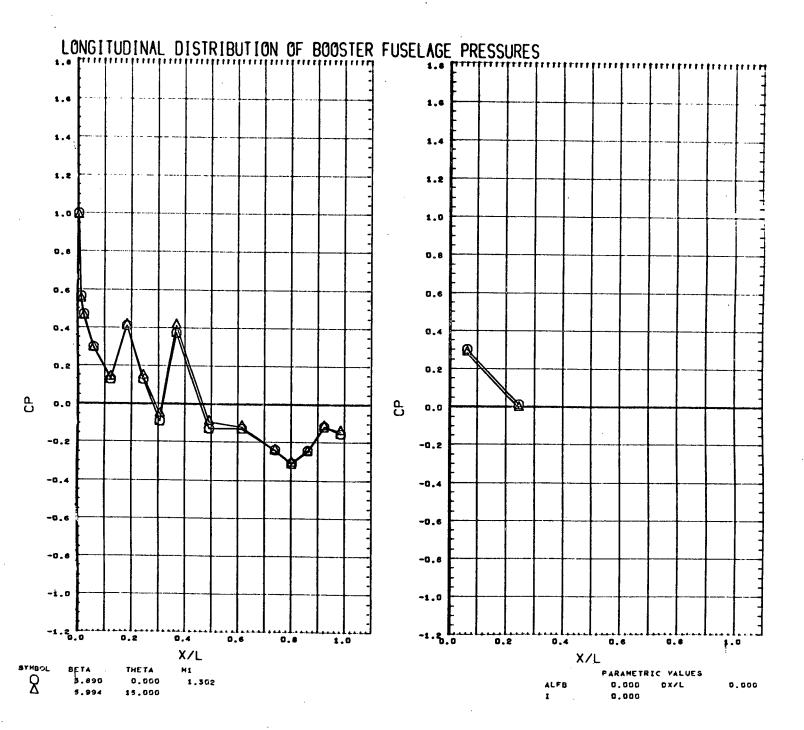


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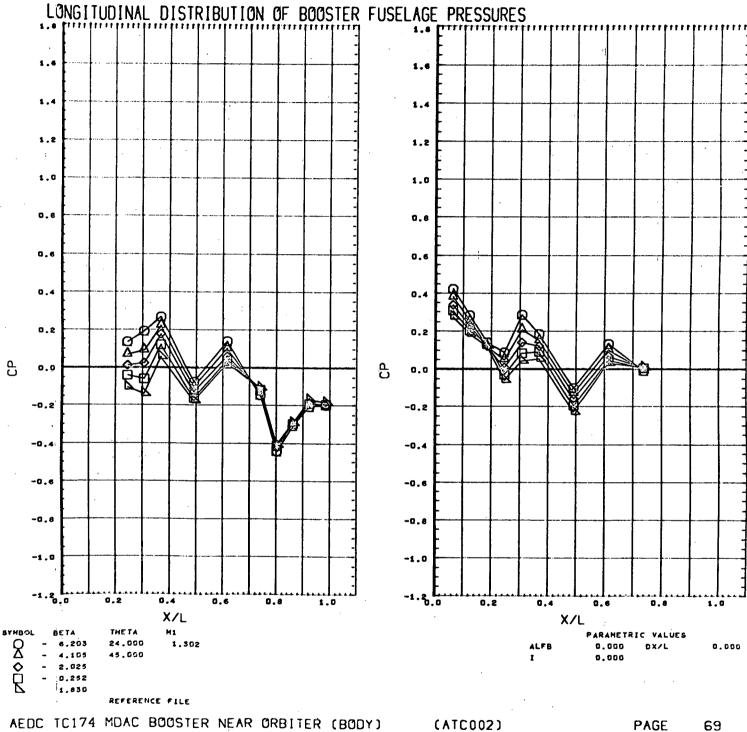




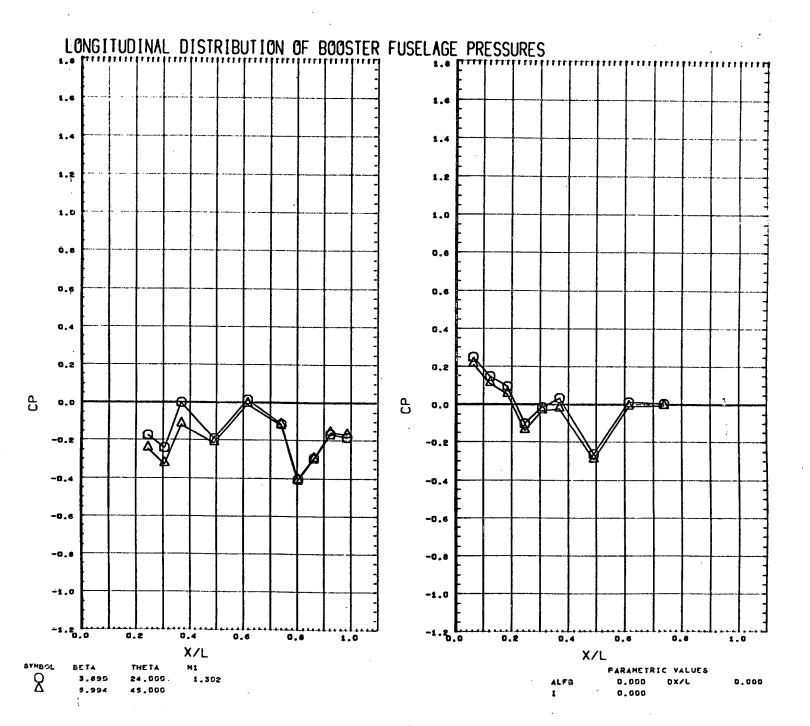
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

(ATC002)

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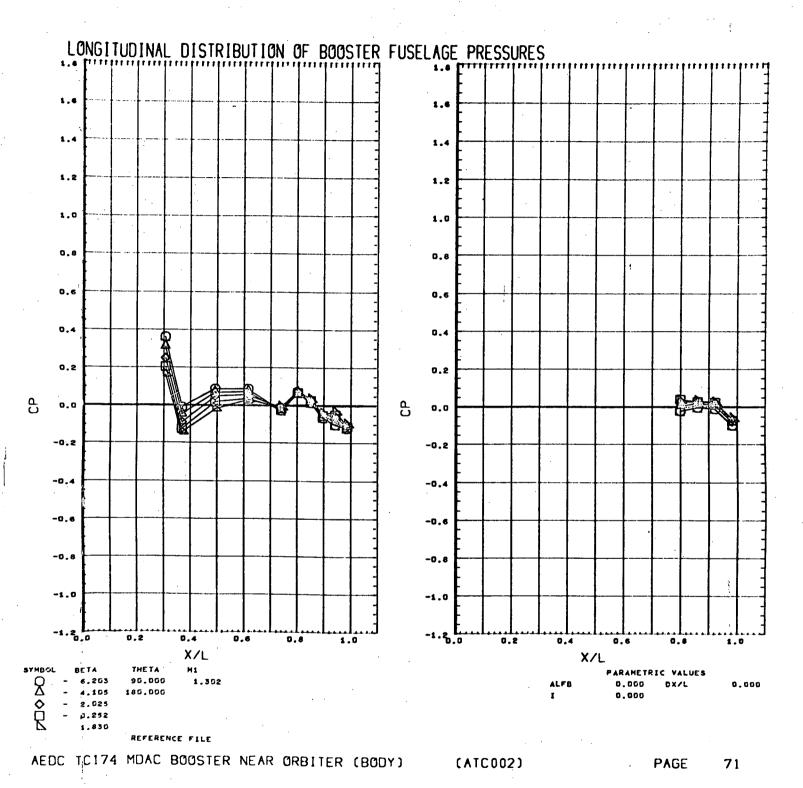
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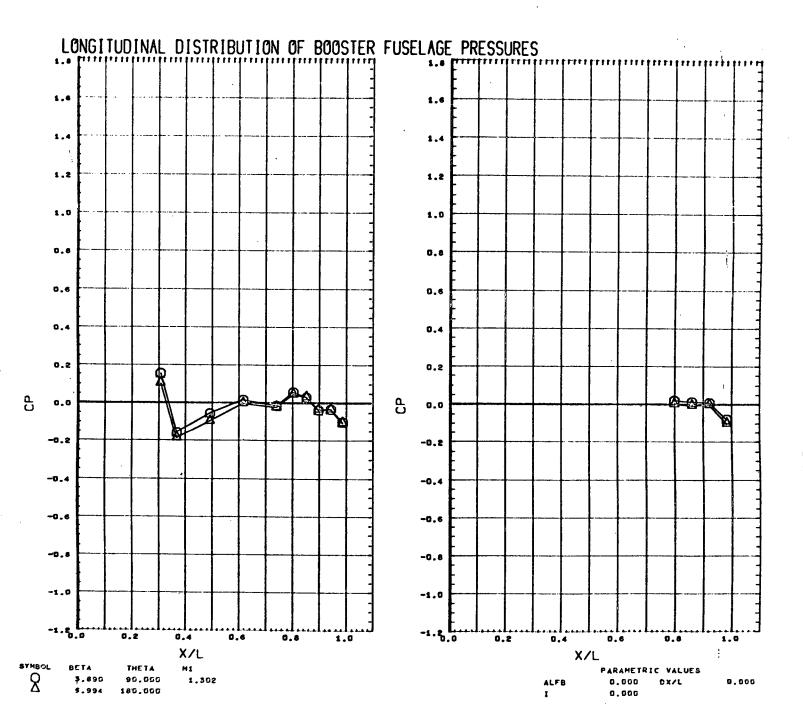


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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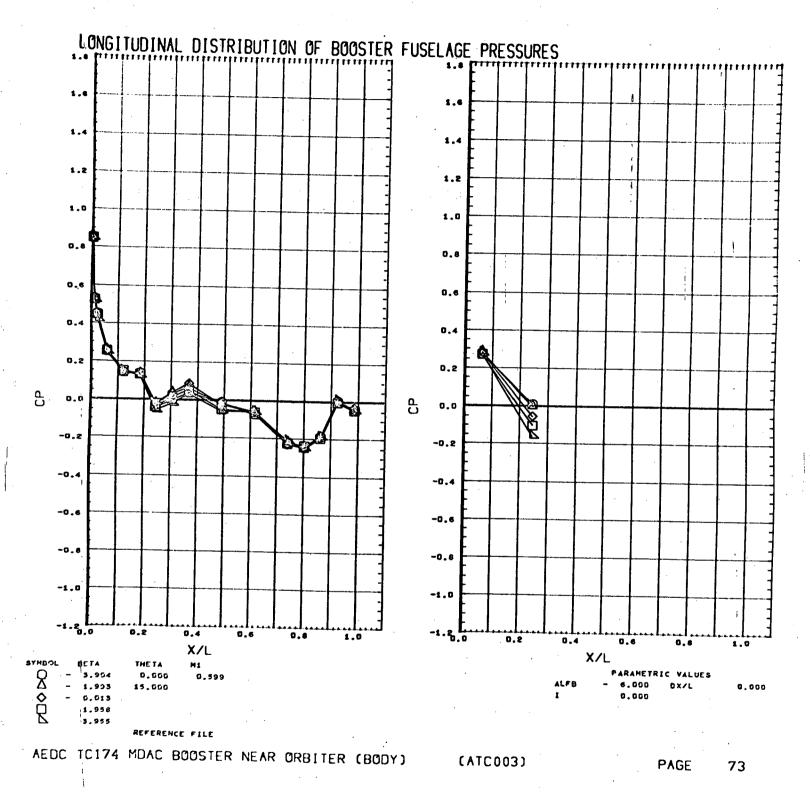


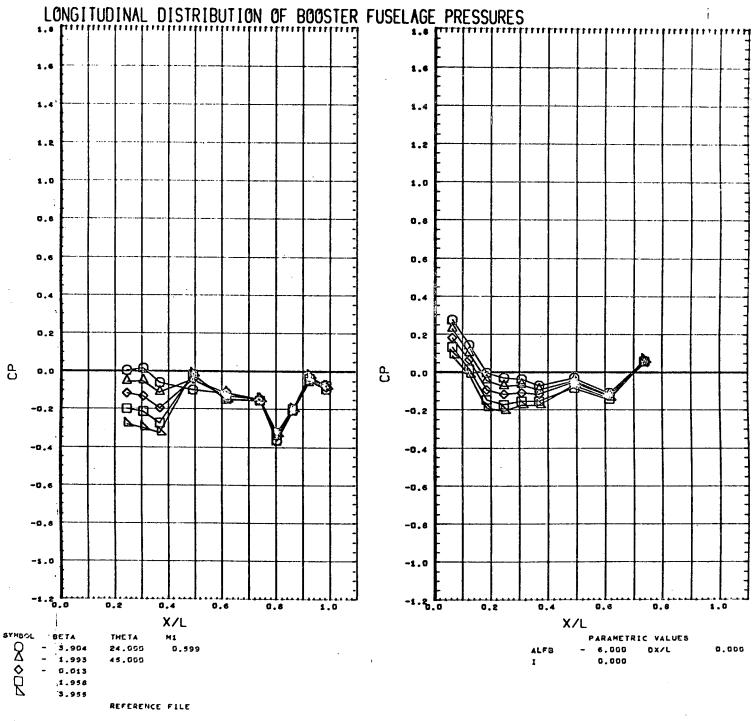


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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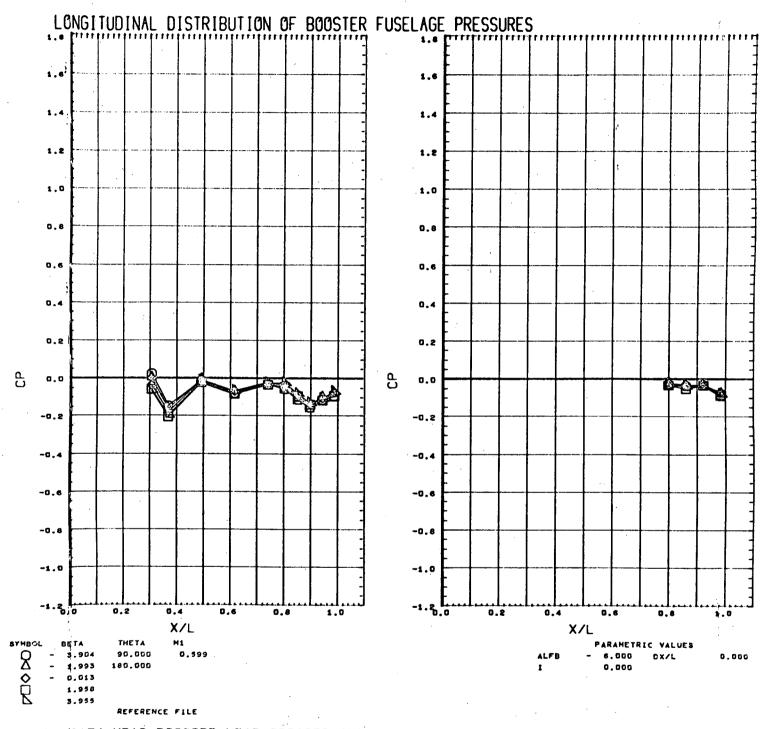
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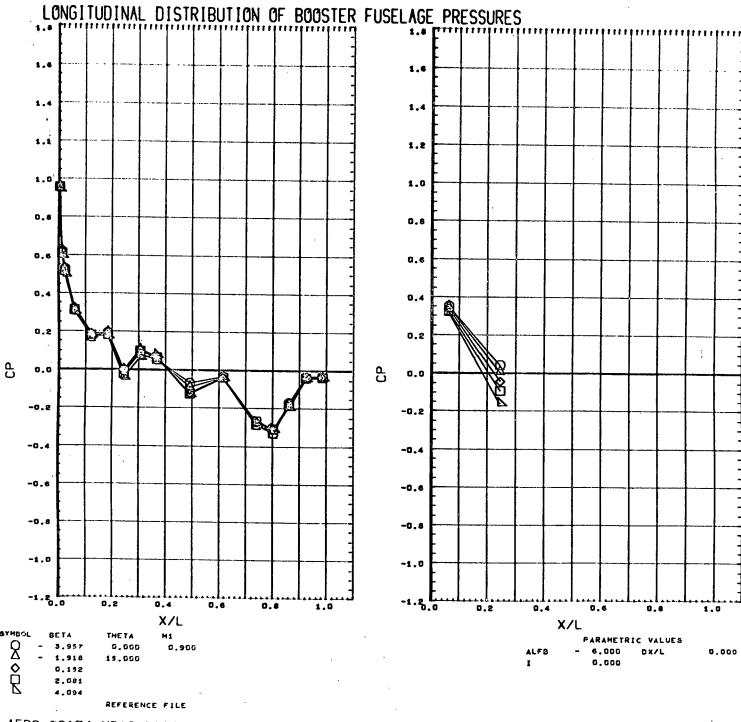
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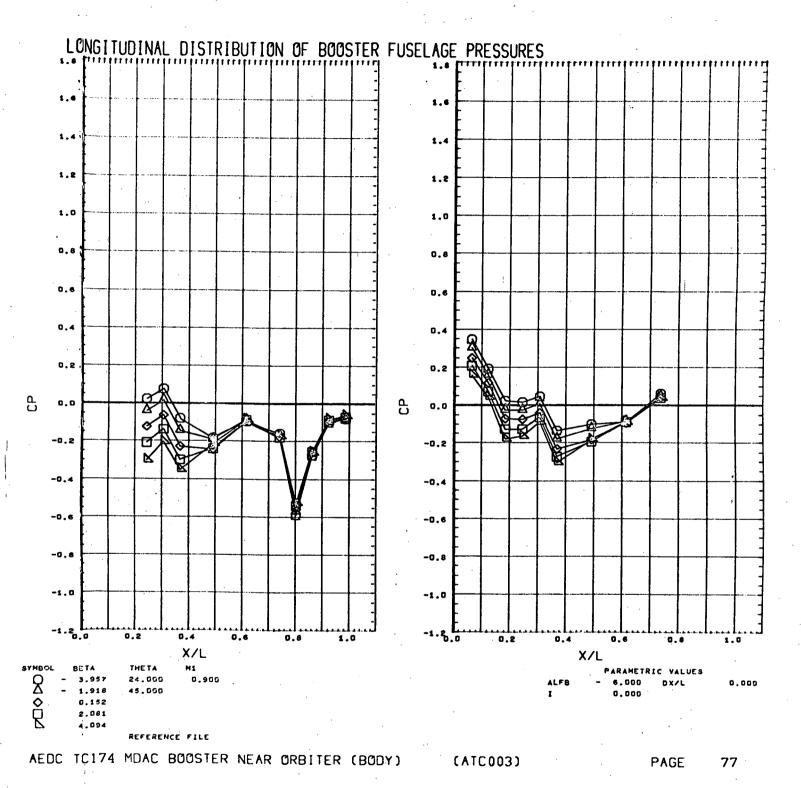
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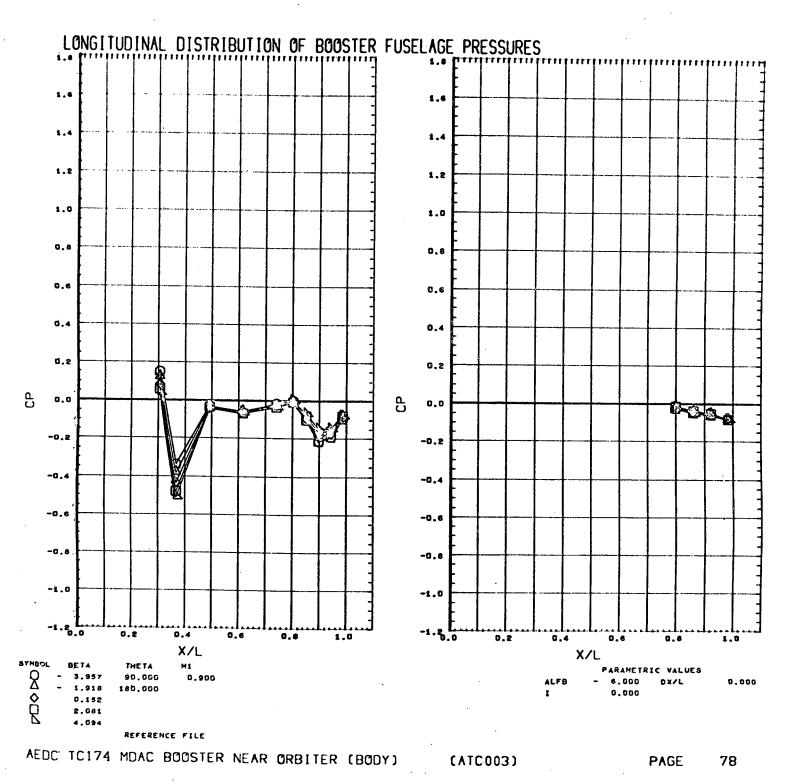
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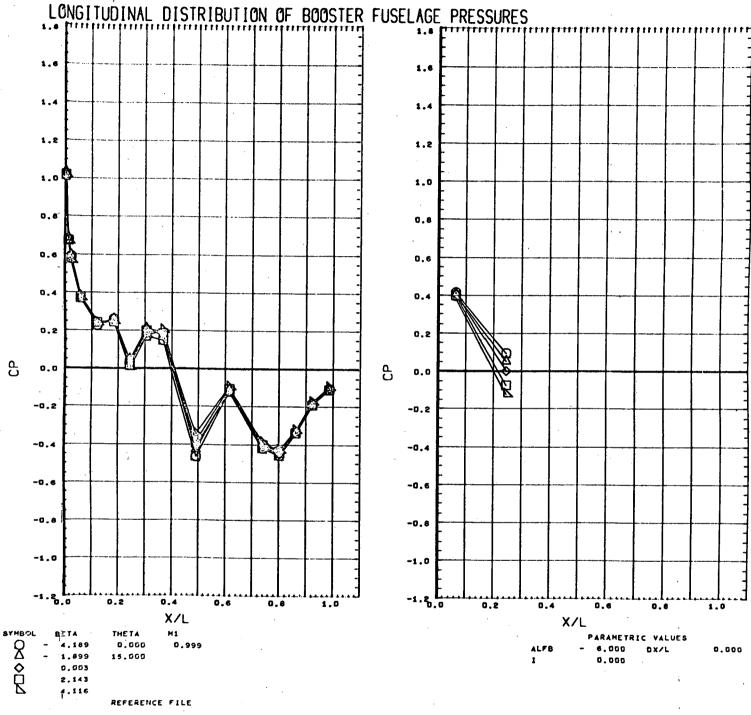


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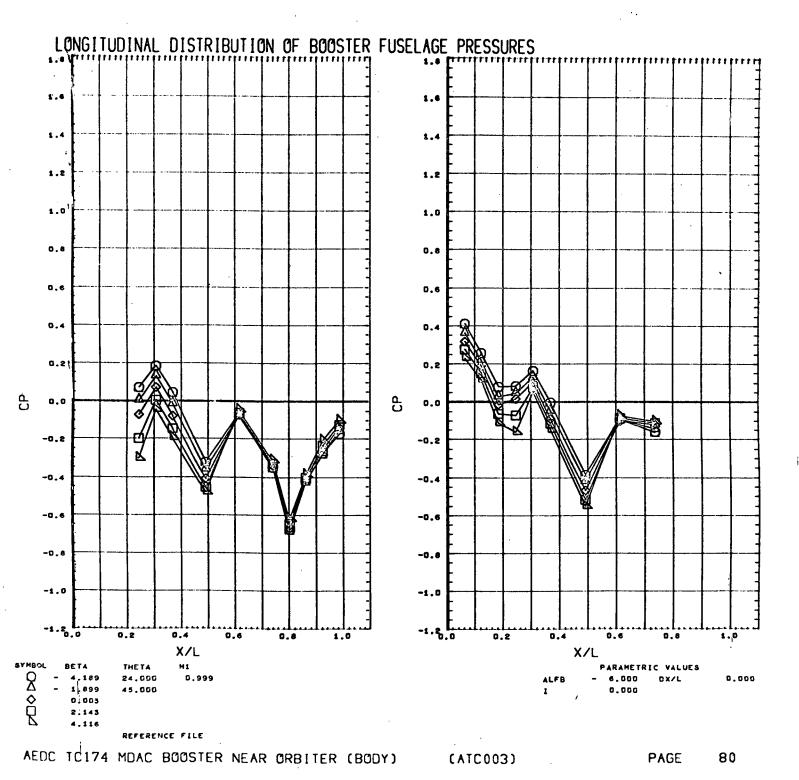


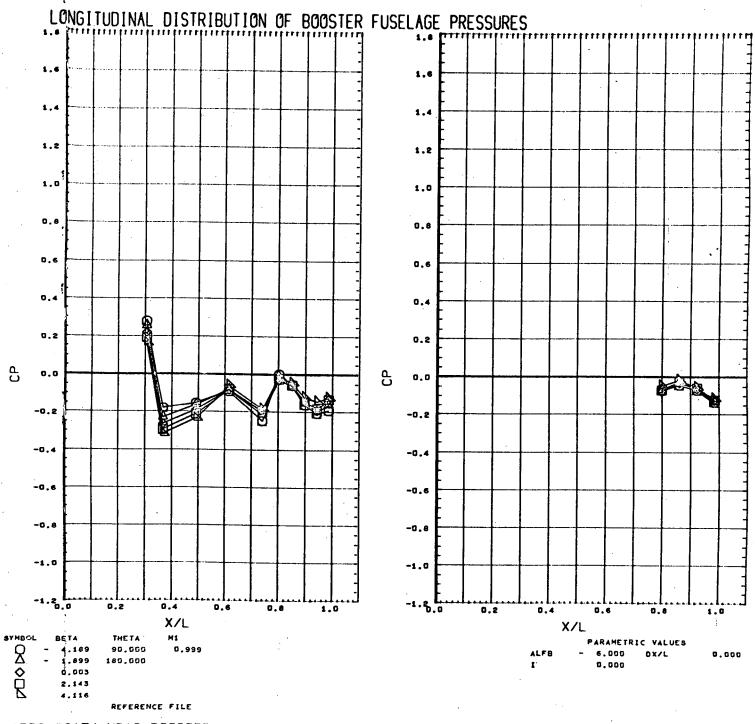




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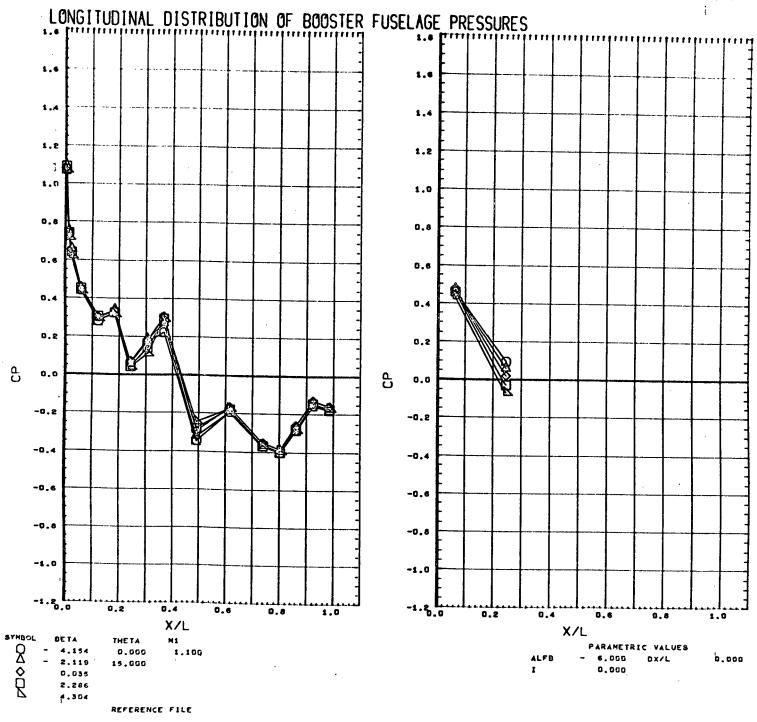
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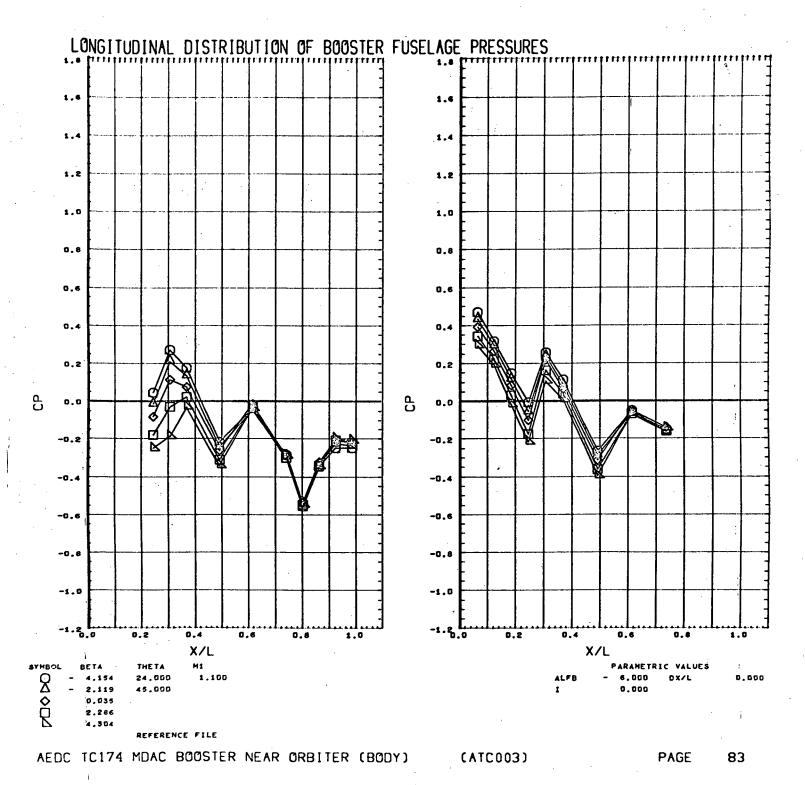
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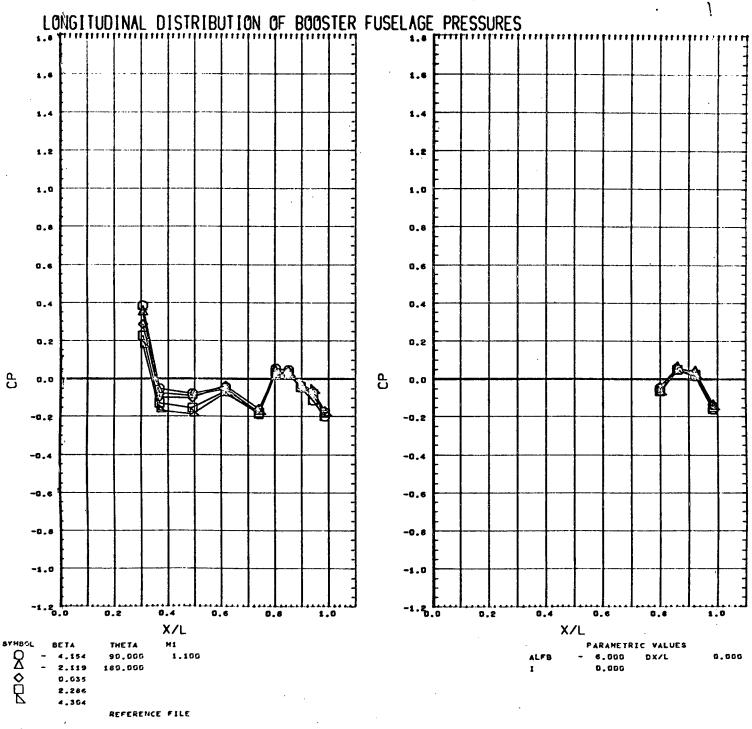
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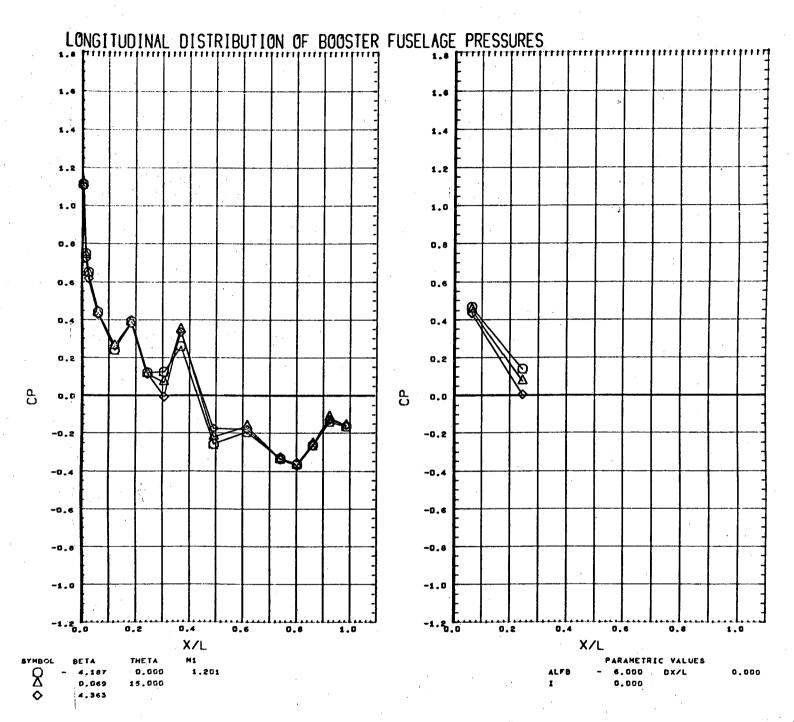
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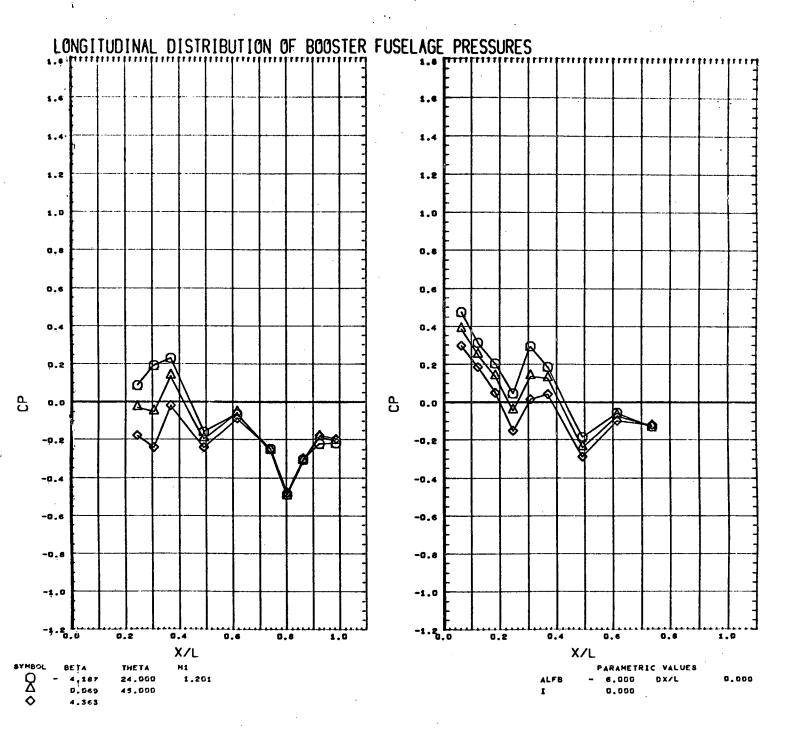
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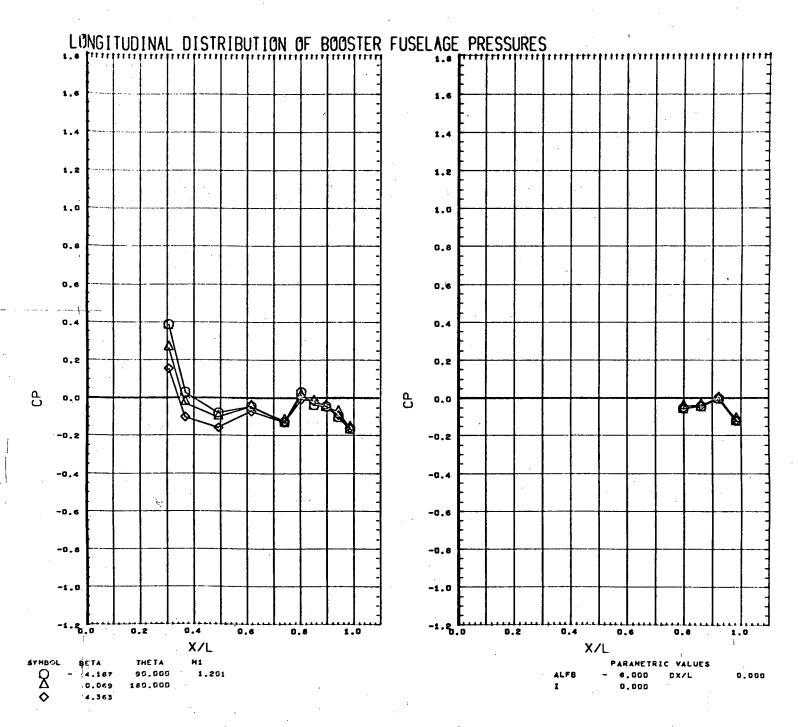
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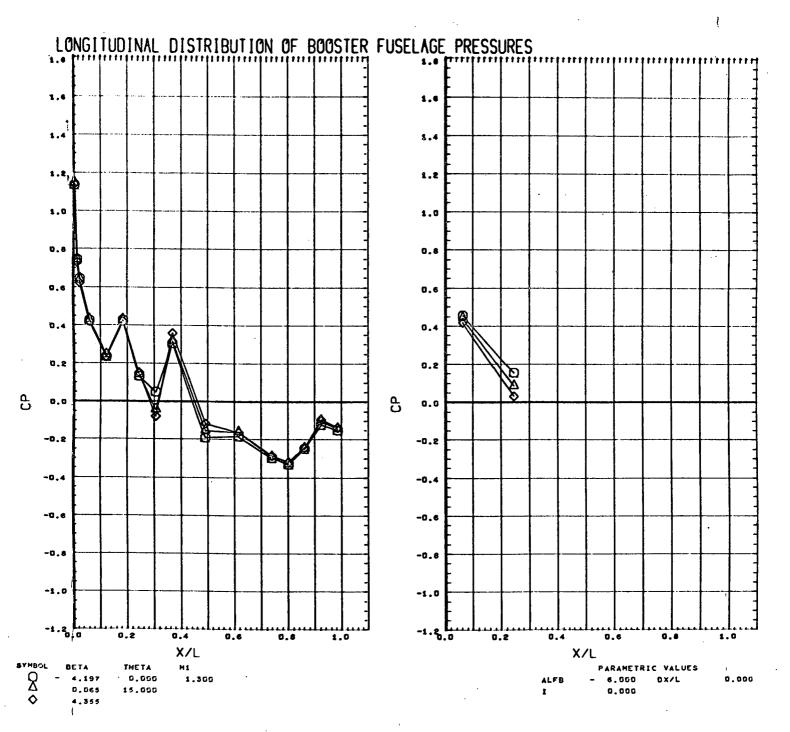
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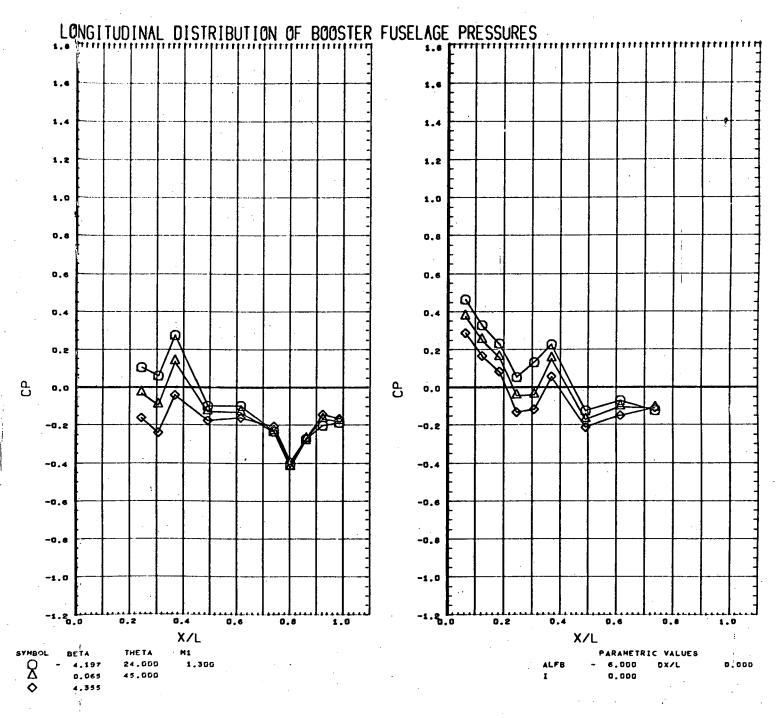
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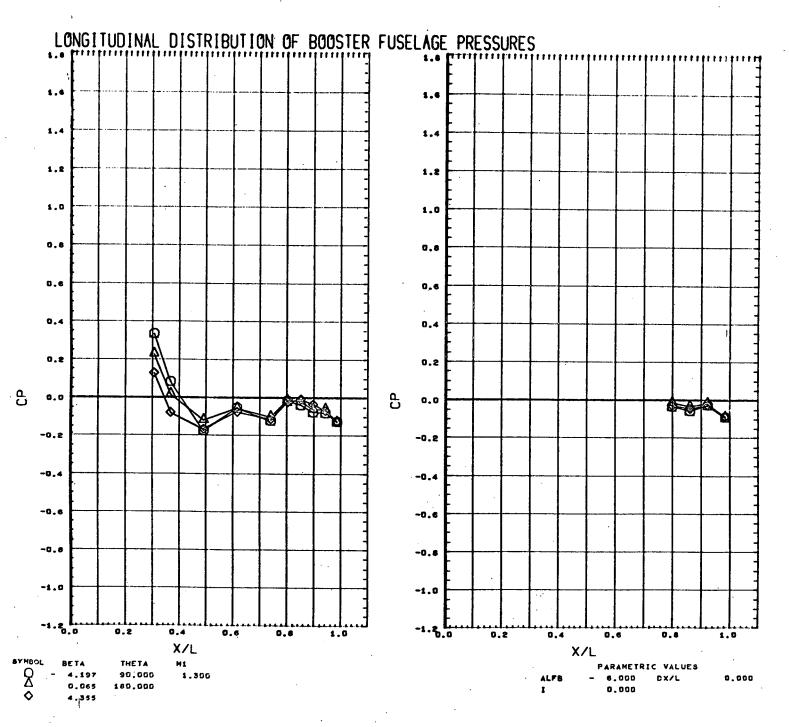
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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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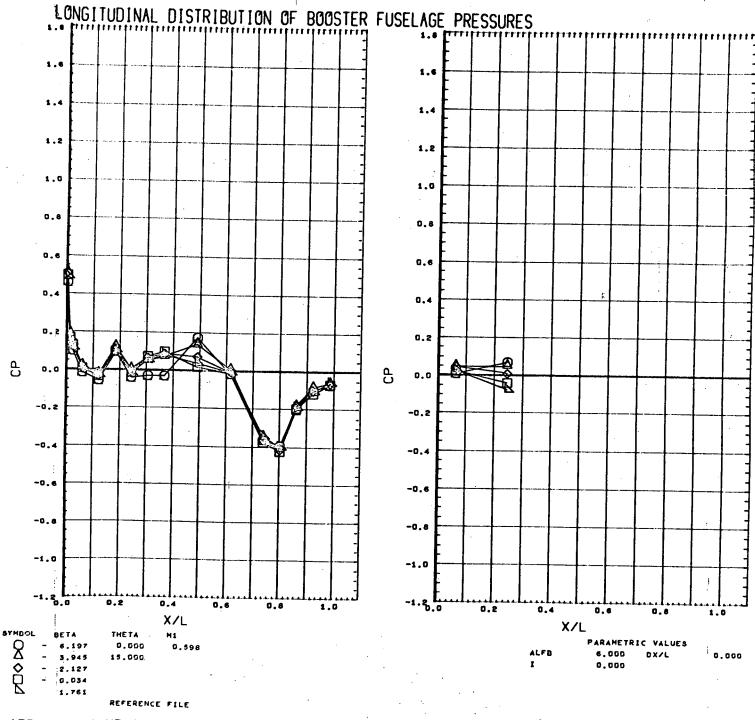


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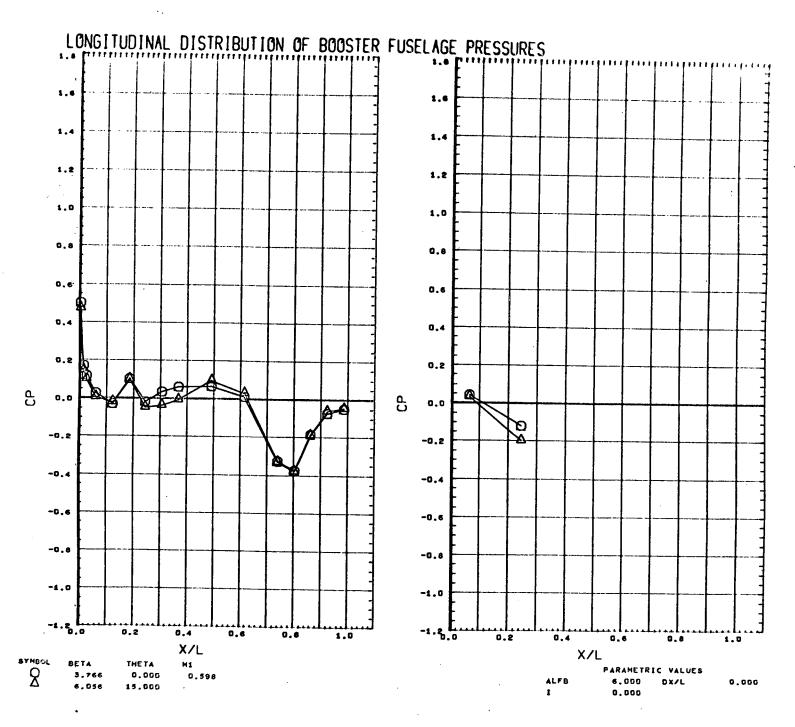
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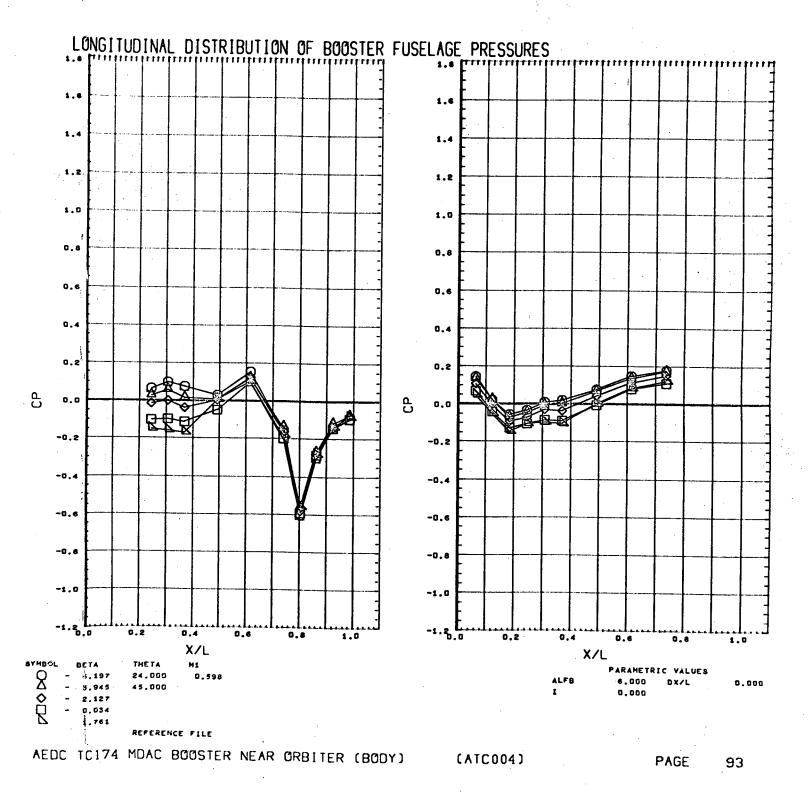
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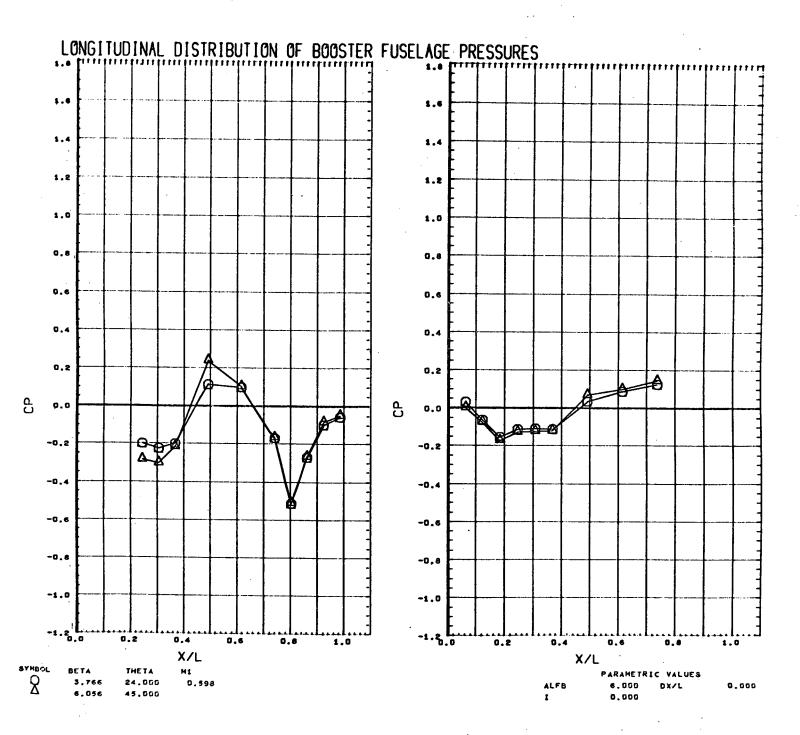


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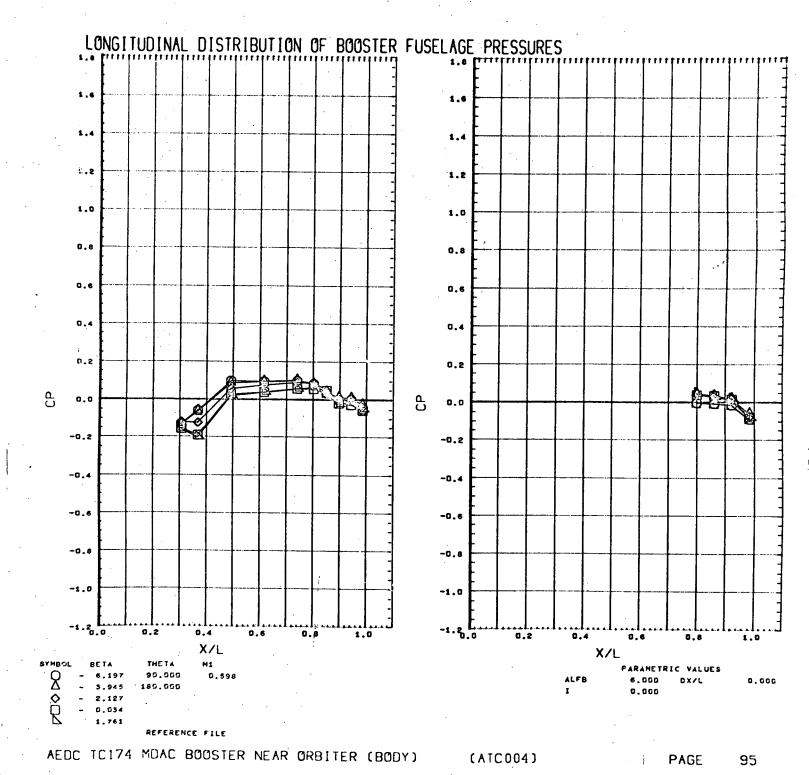


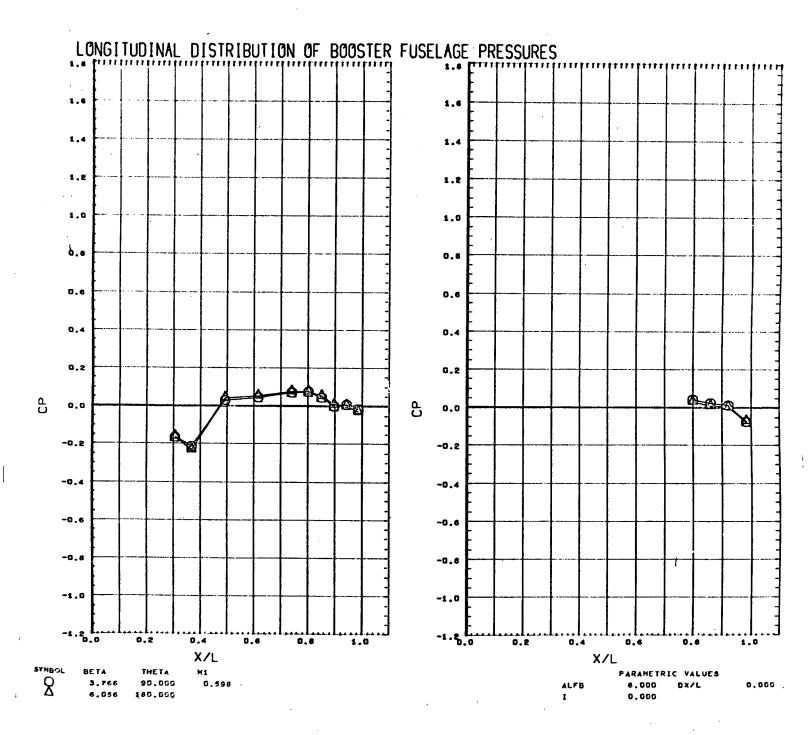


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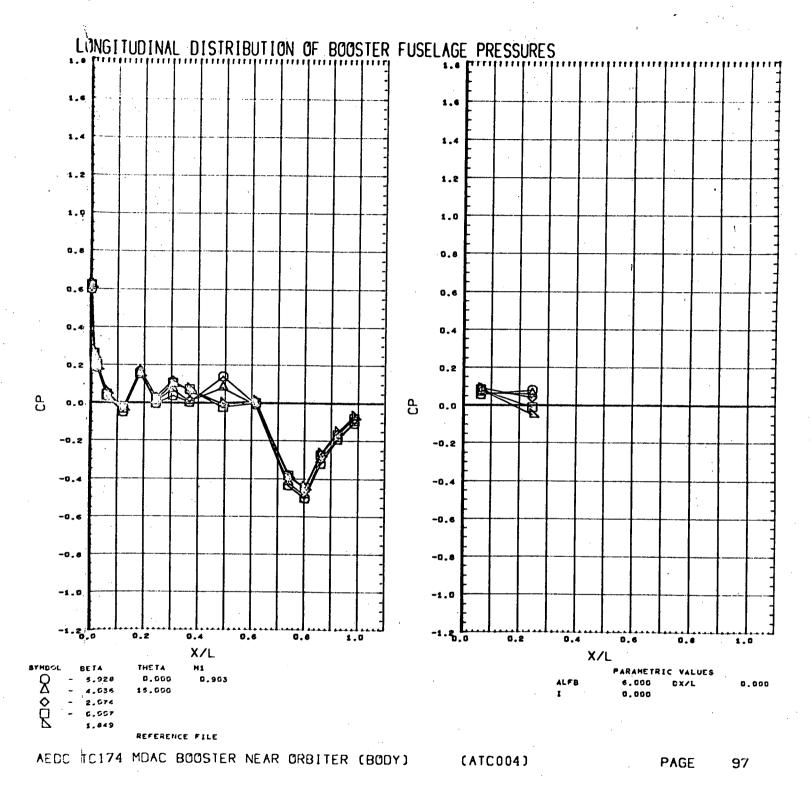


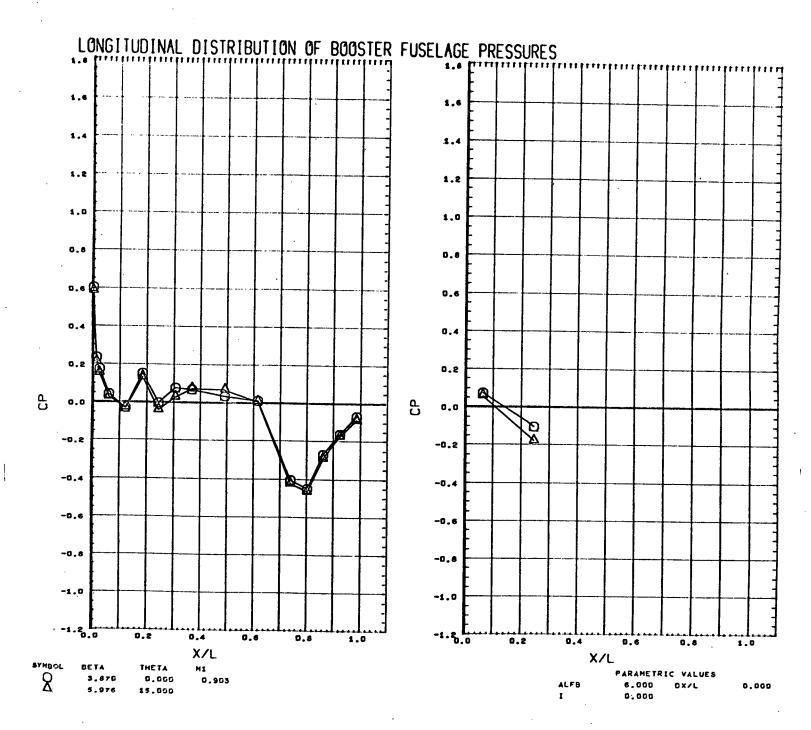


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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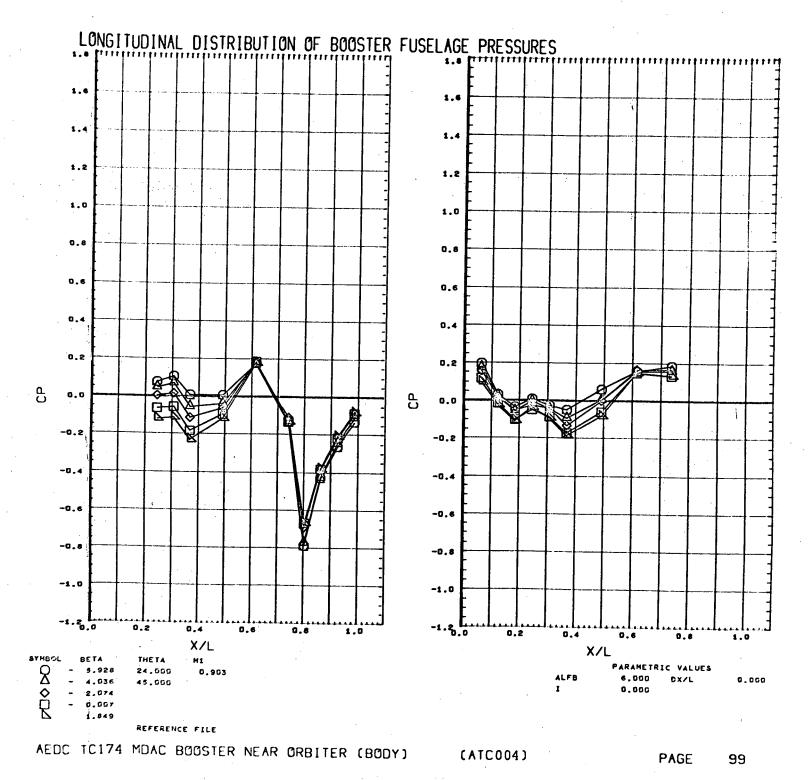


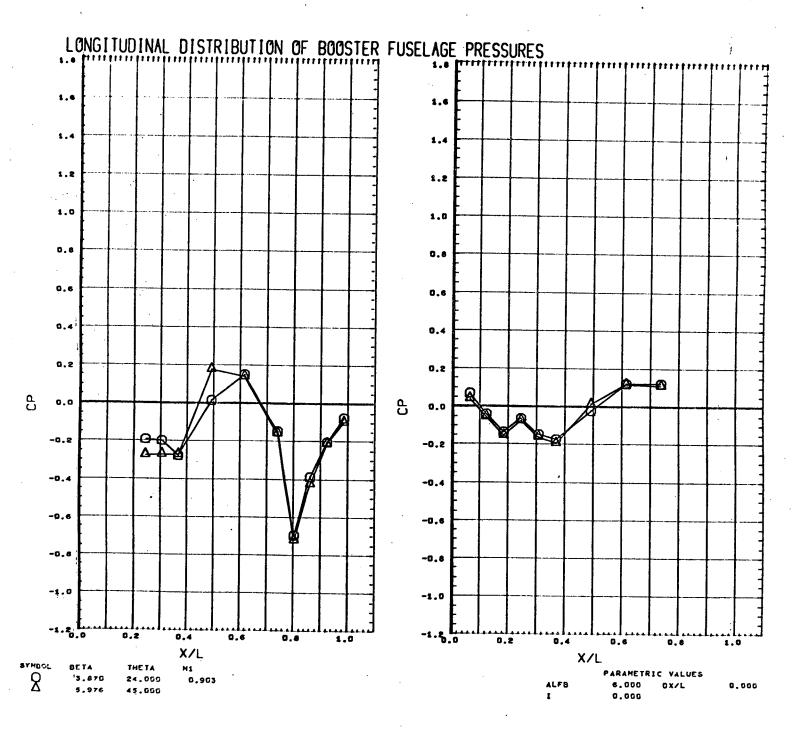
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

(ATC004)

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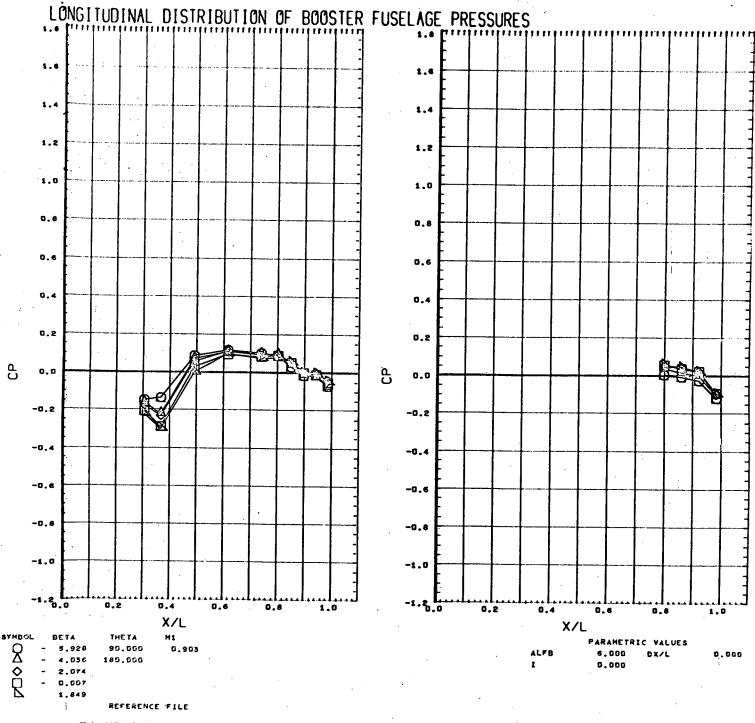




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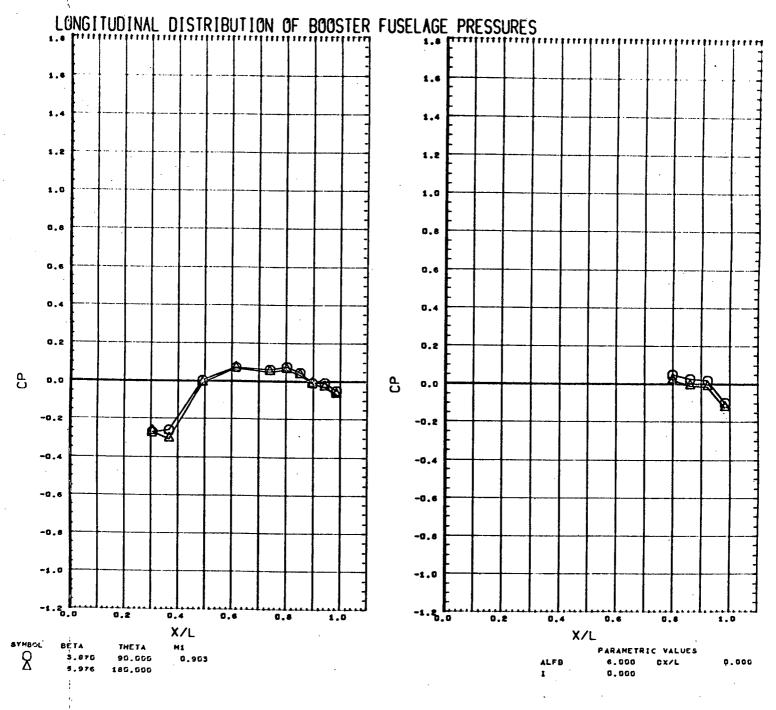
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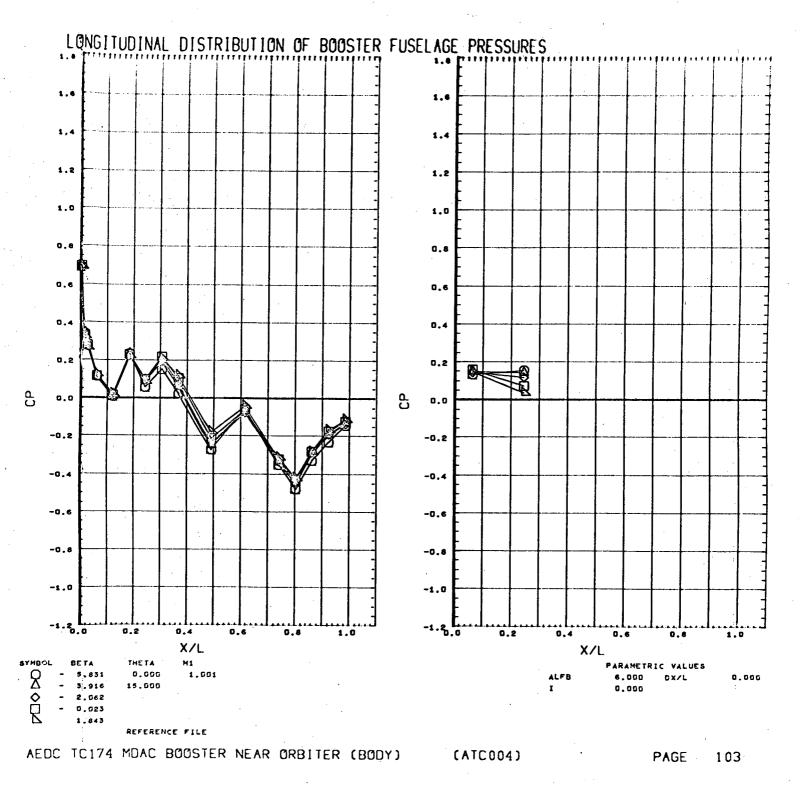
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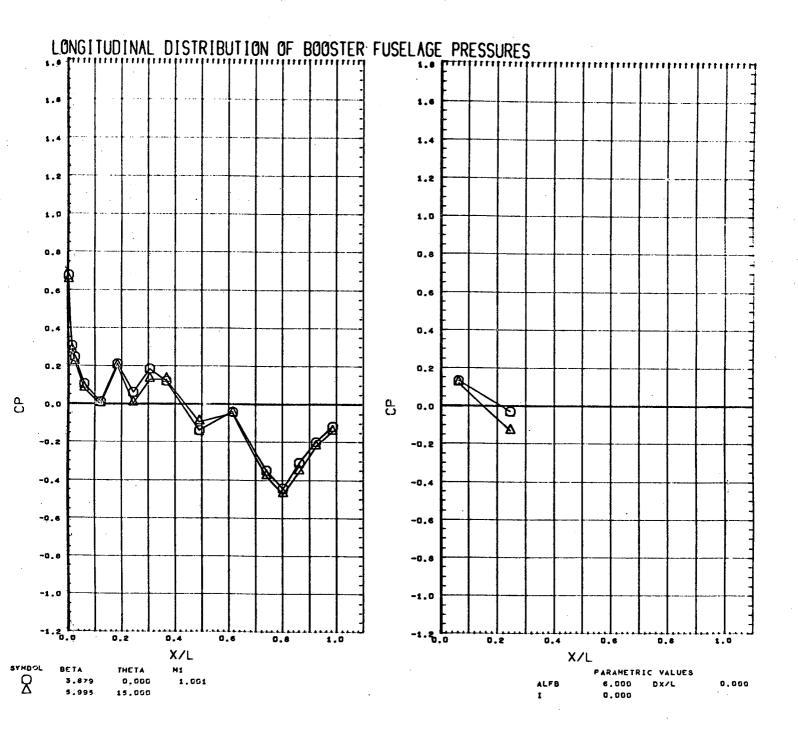


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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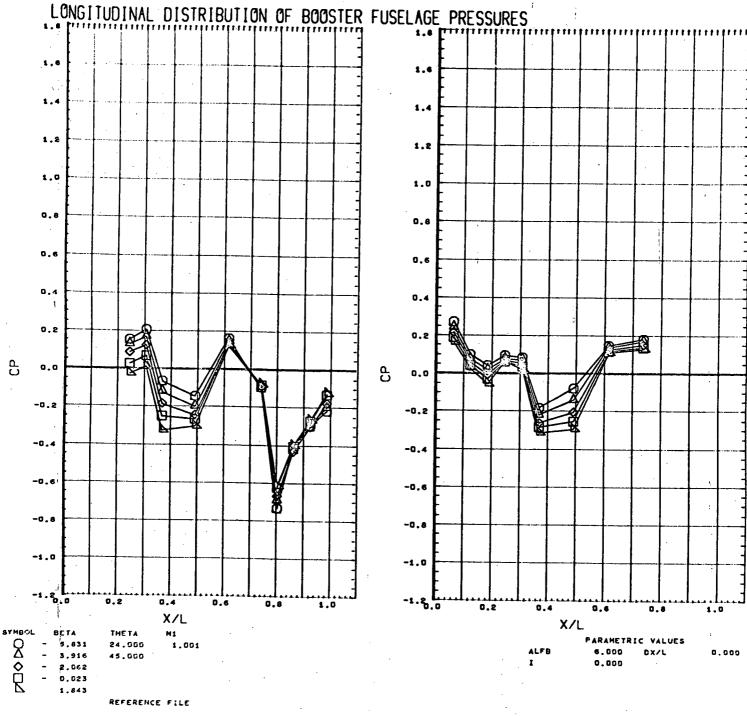




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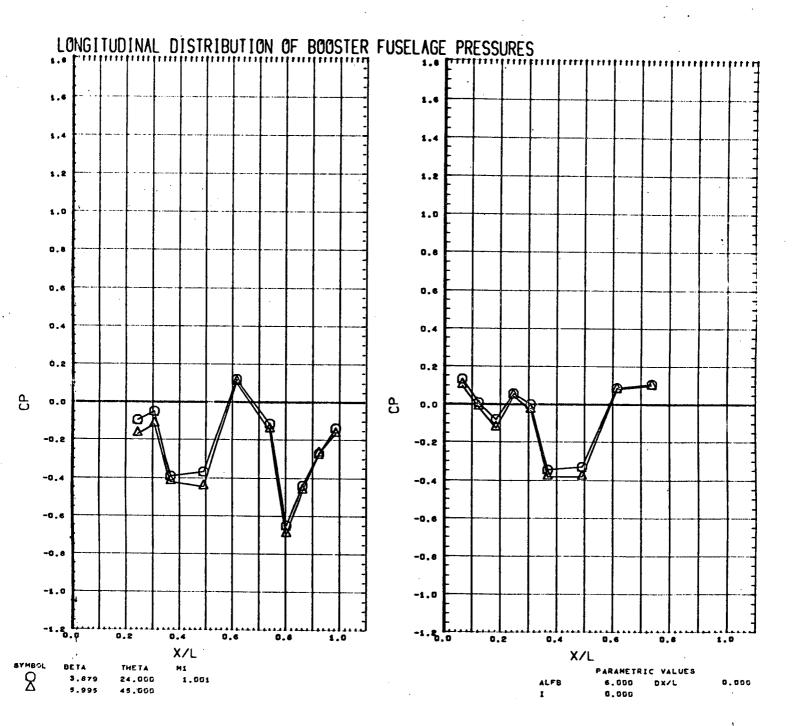
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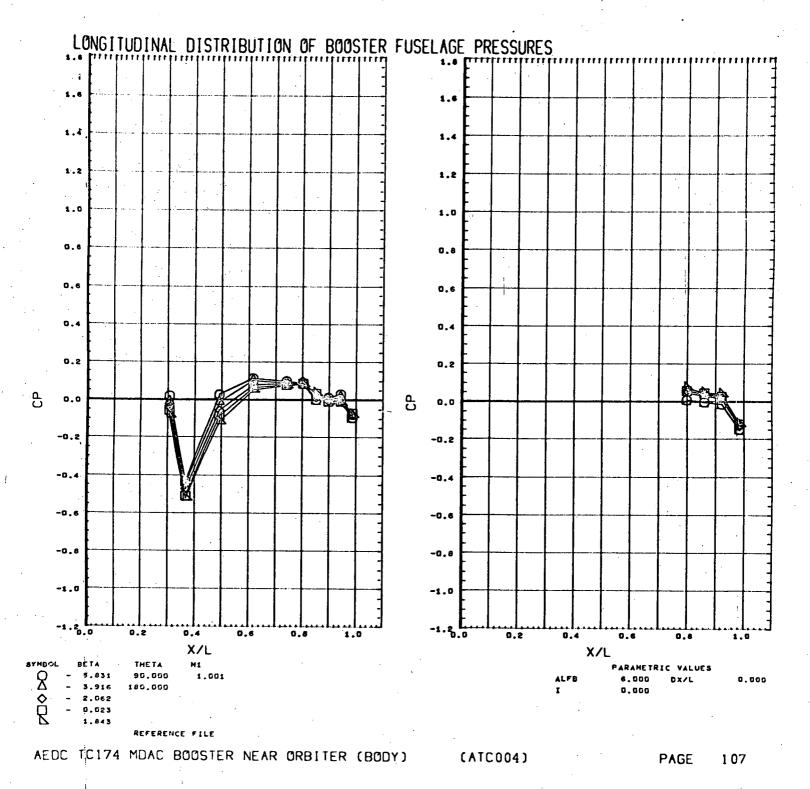
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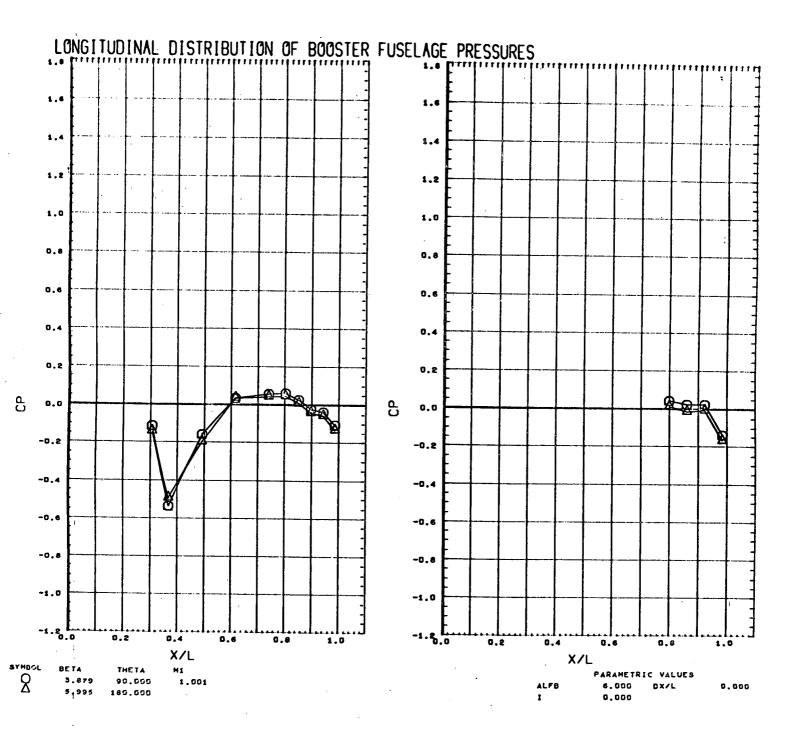
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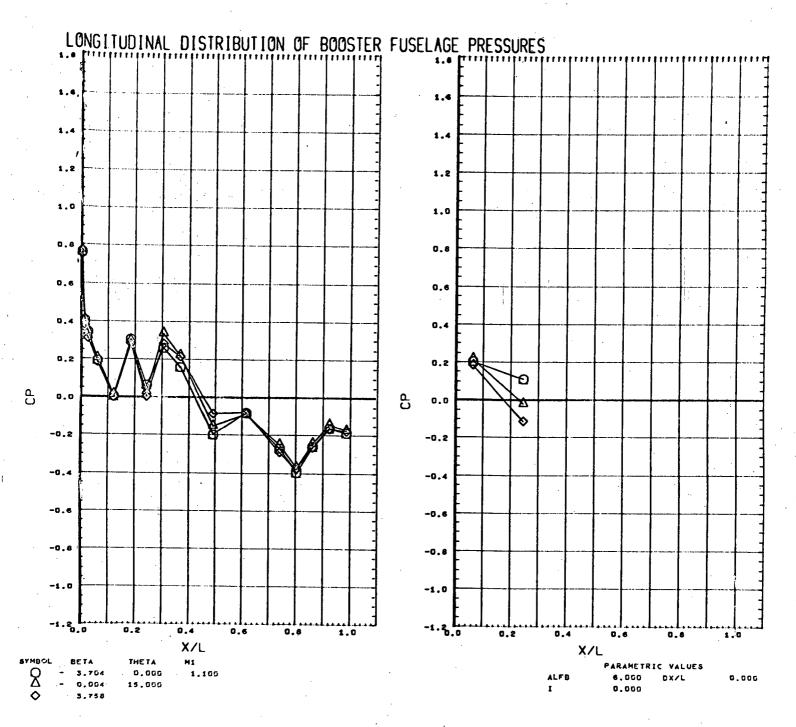
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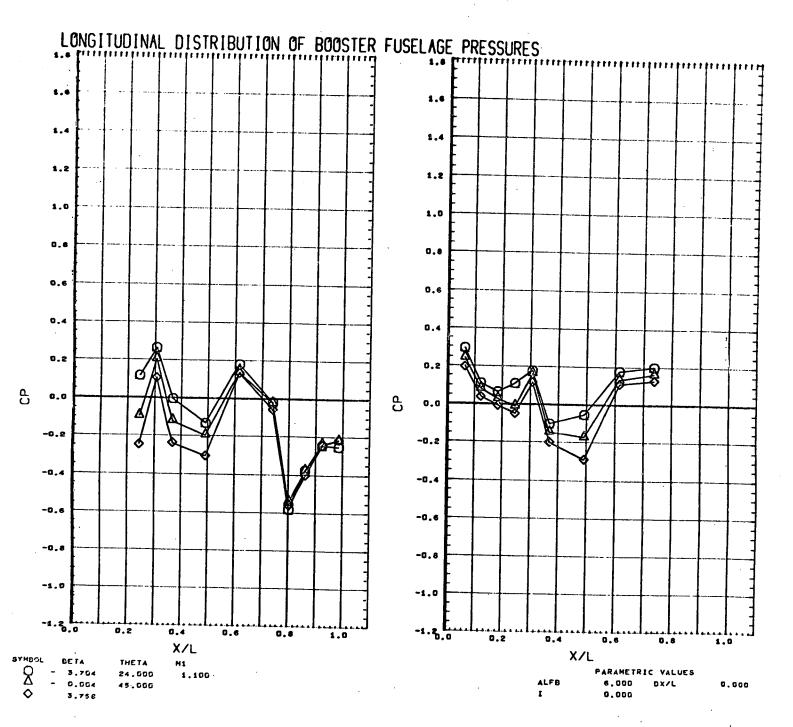
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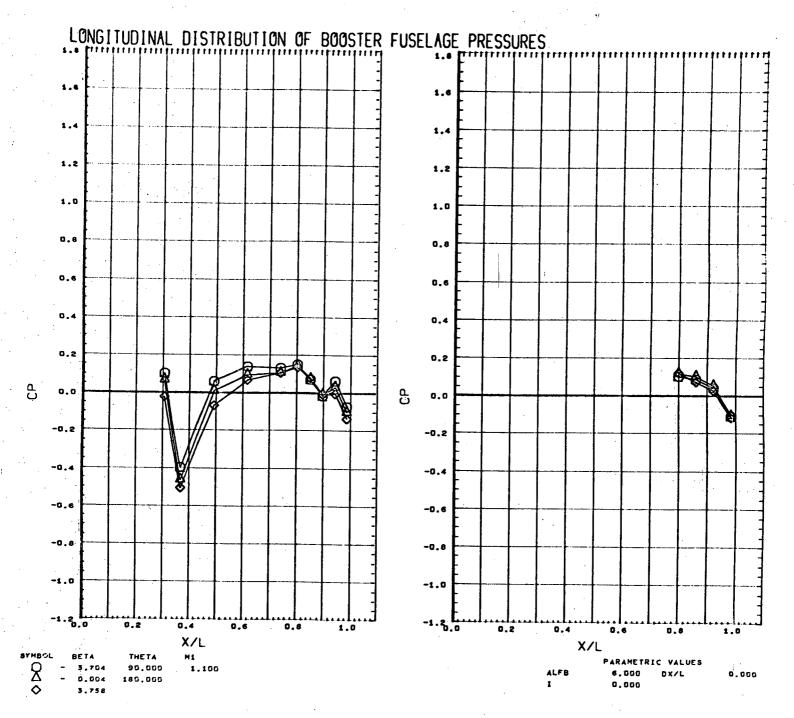
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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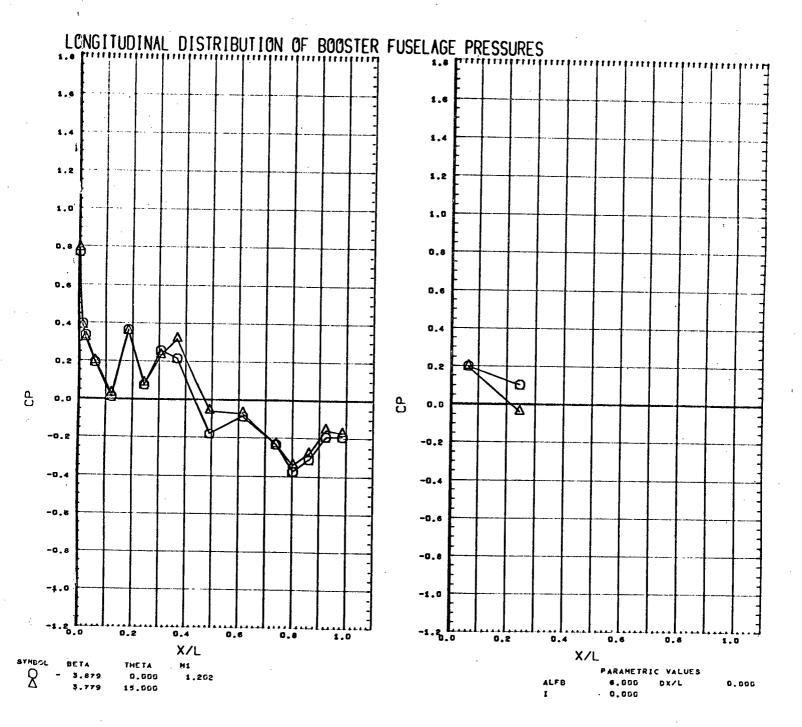


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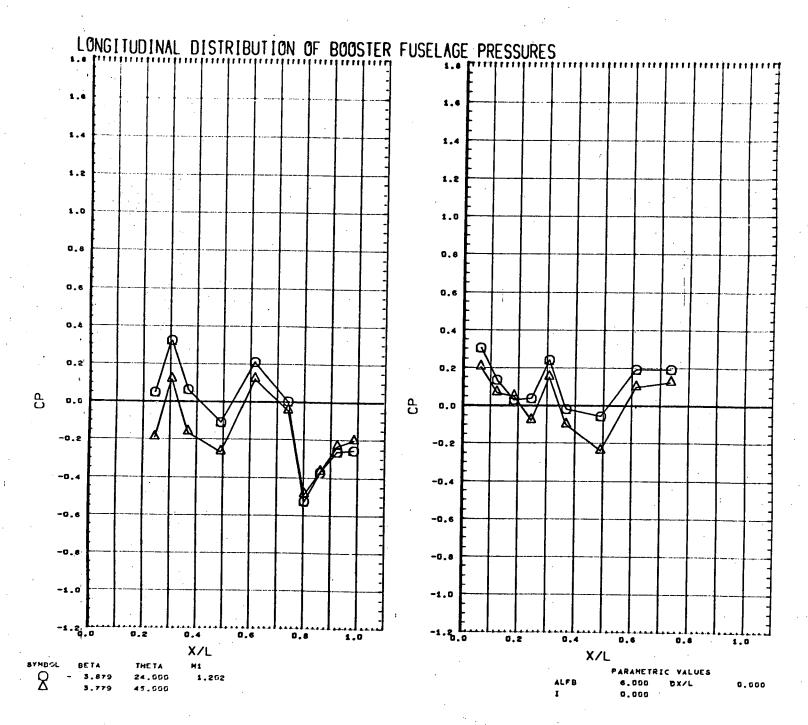
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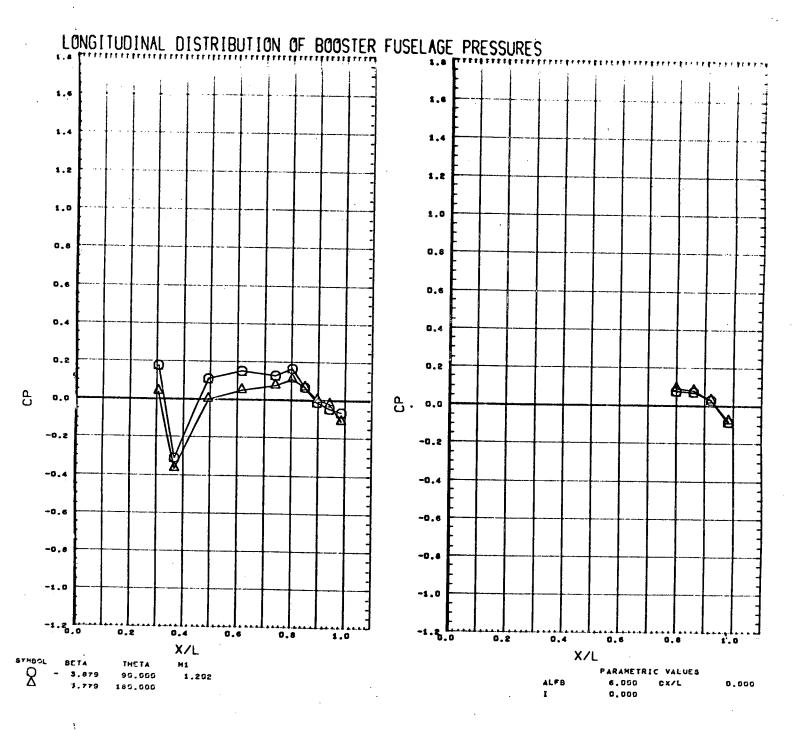
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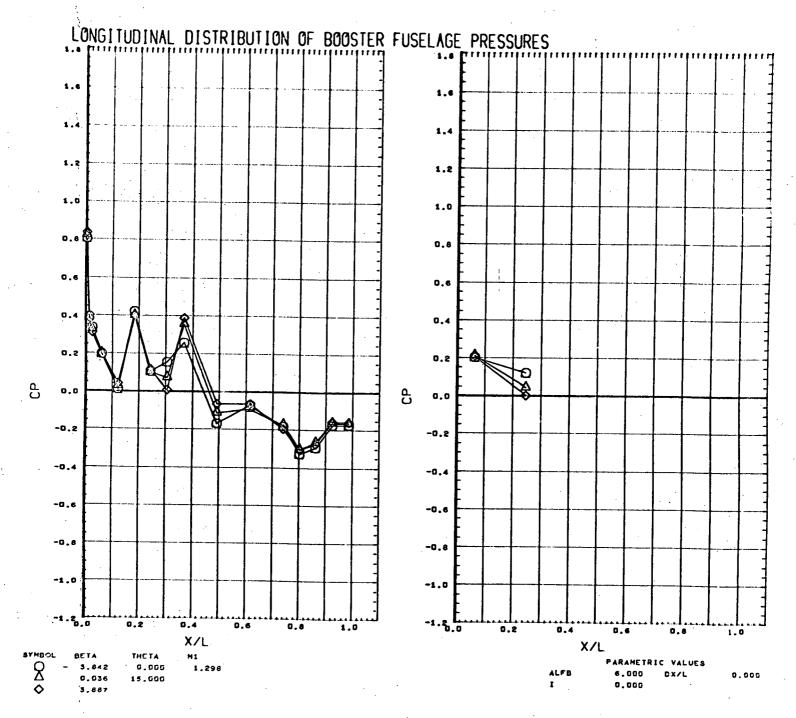
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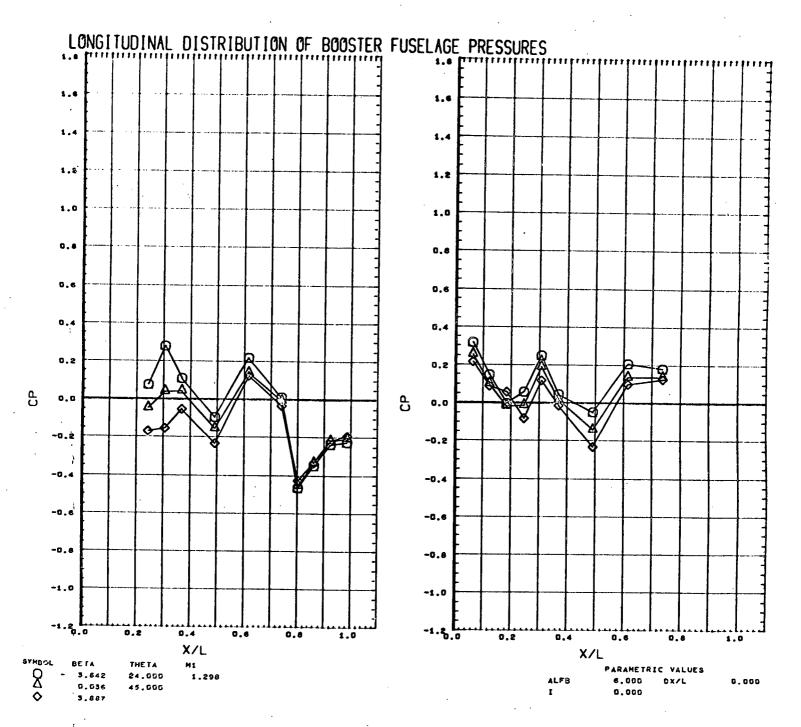
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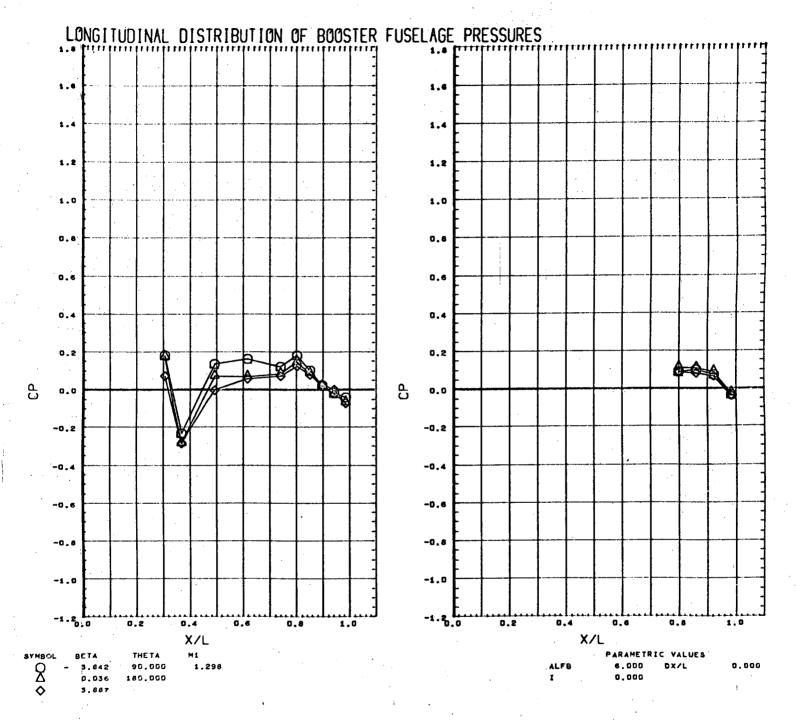
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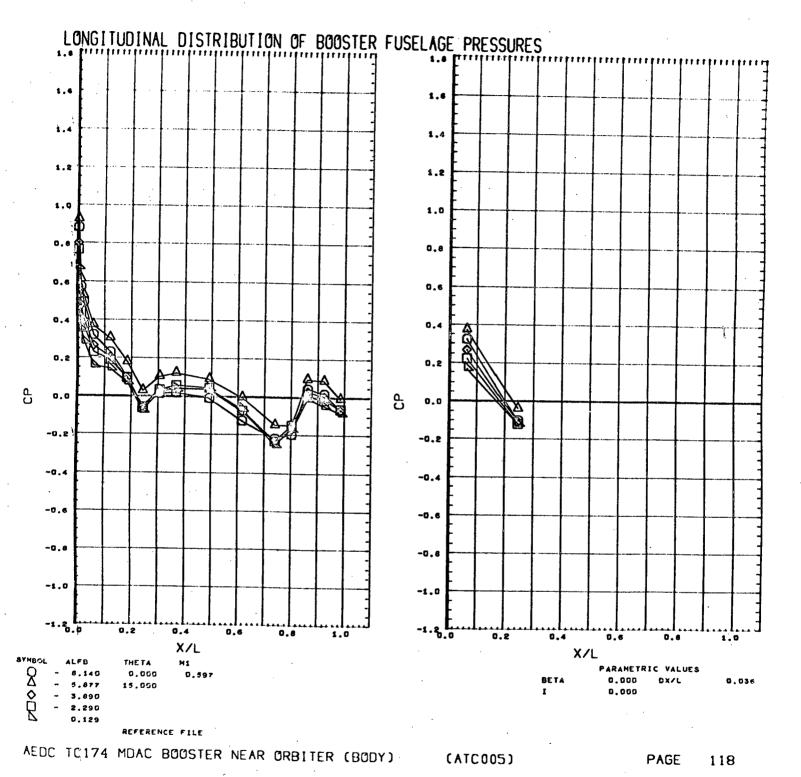
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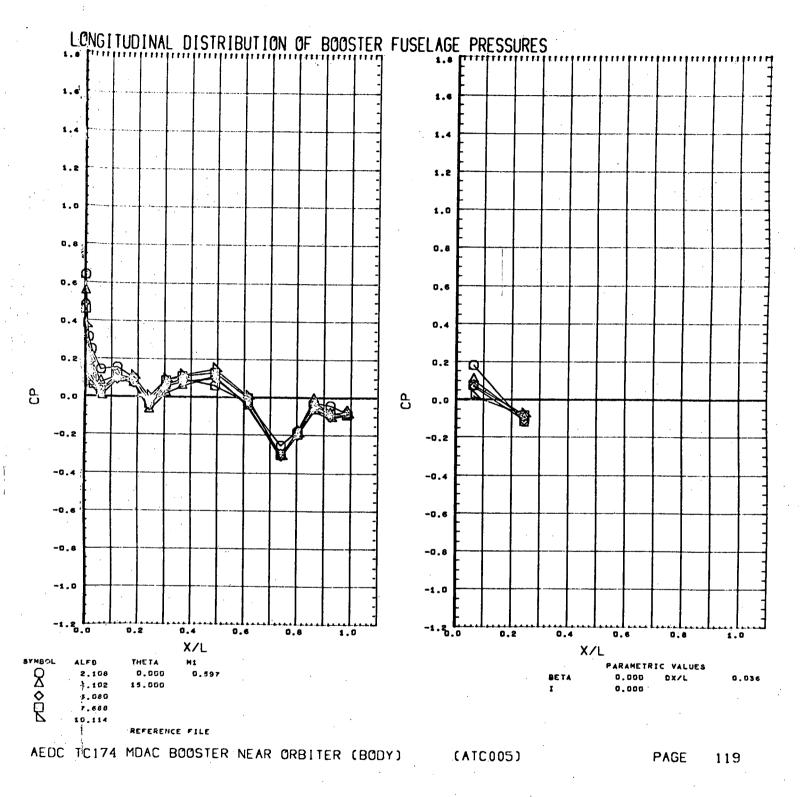


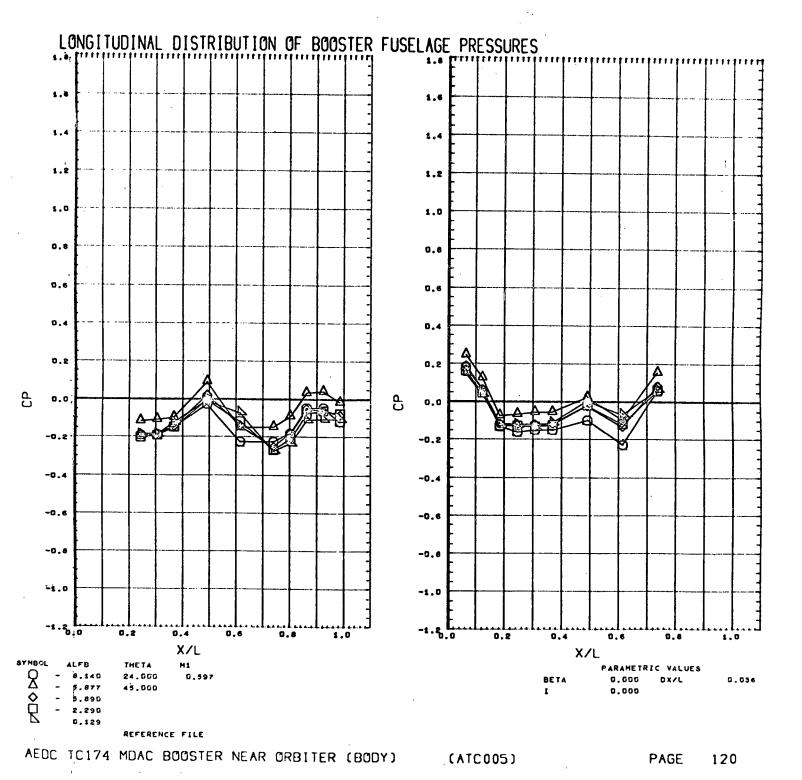
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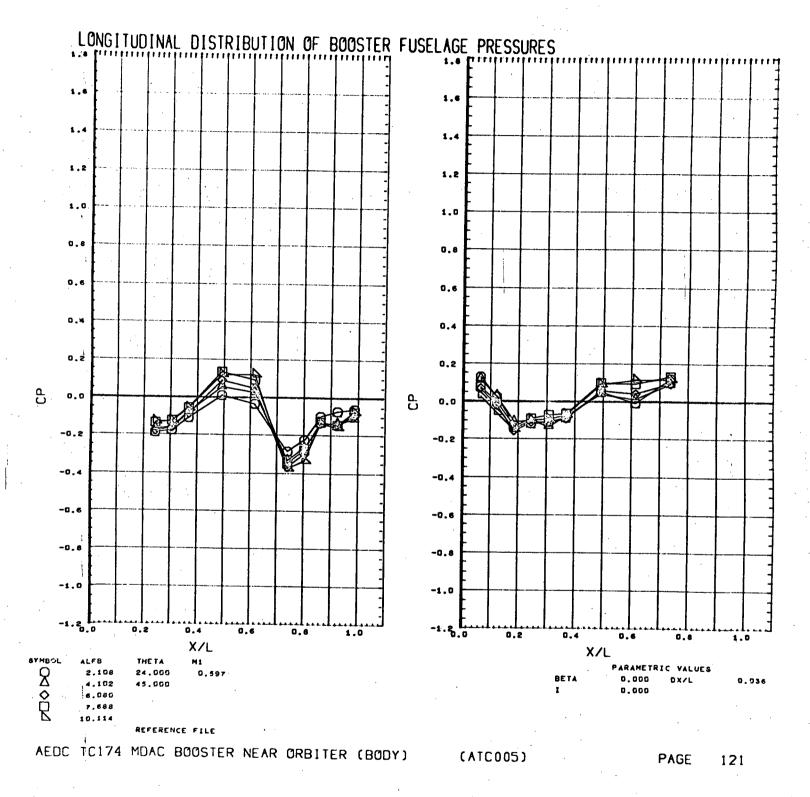
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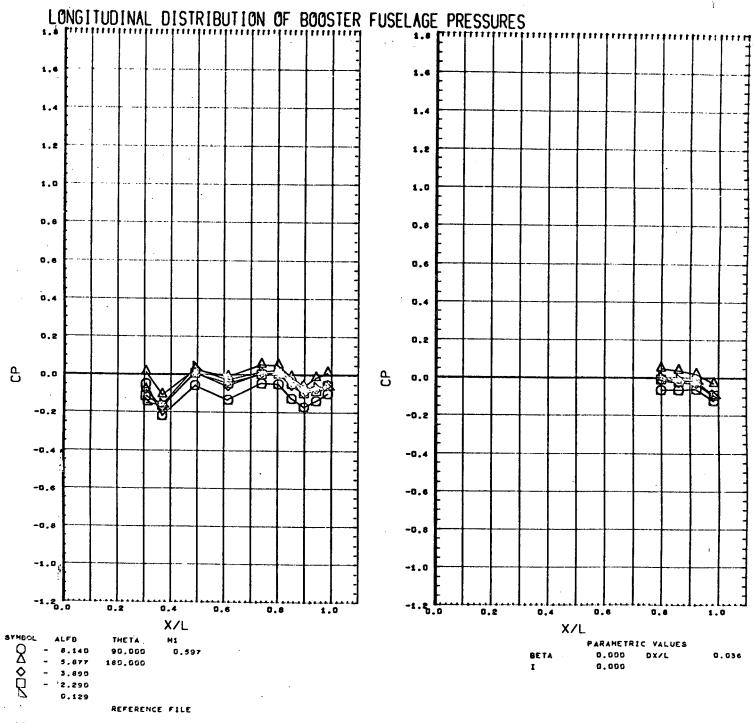
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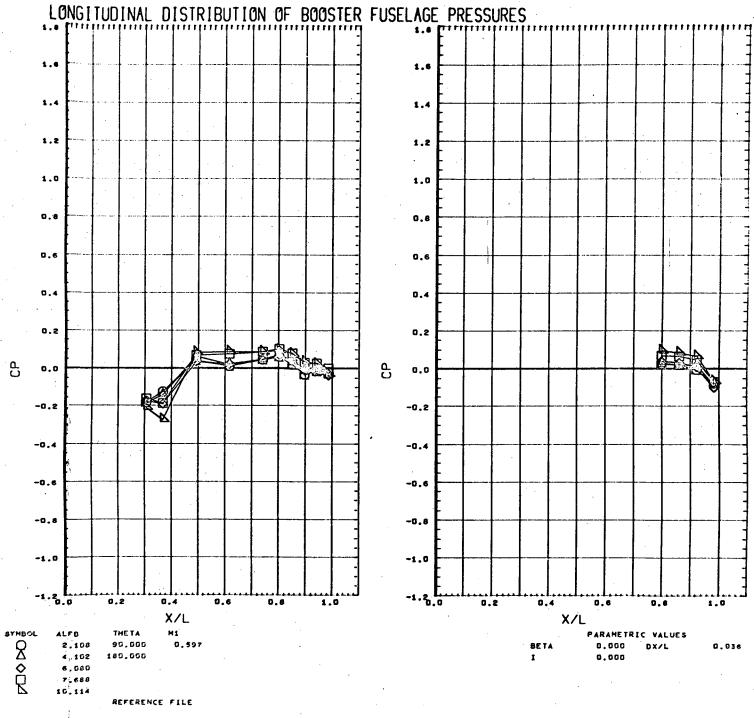






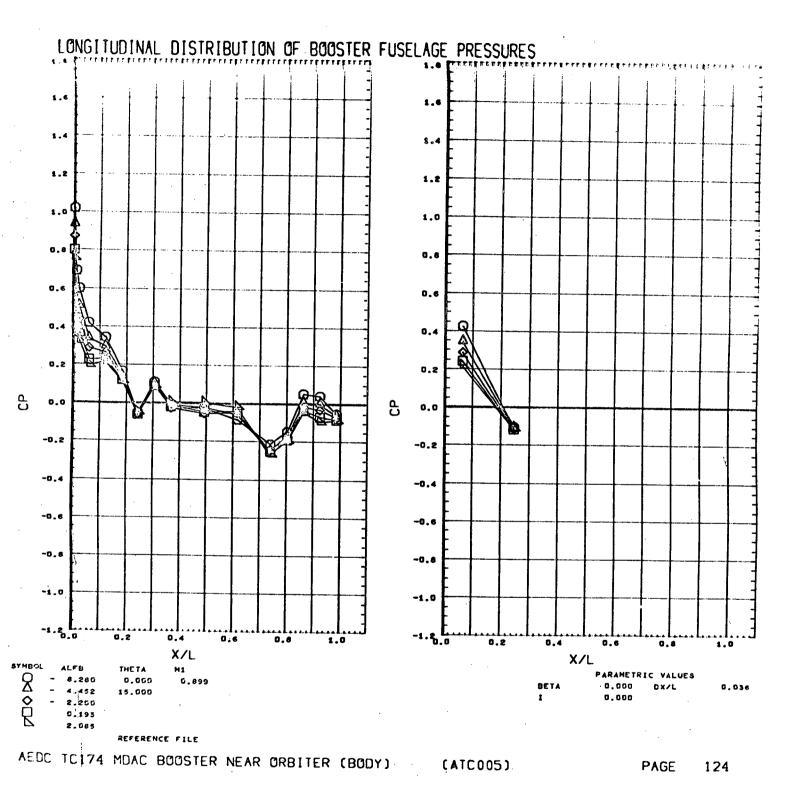


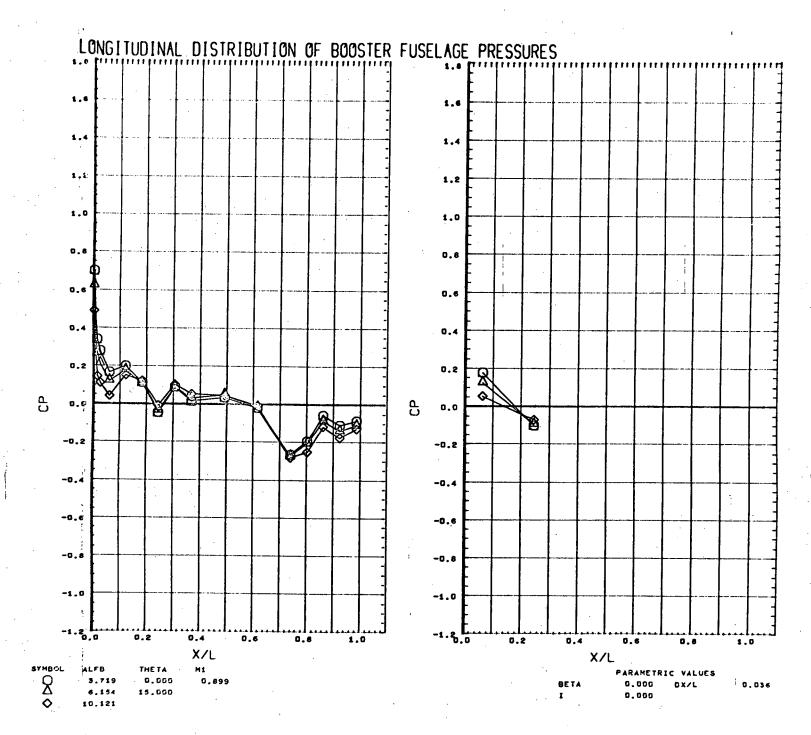




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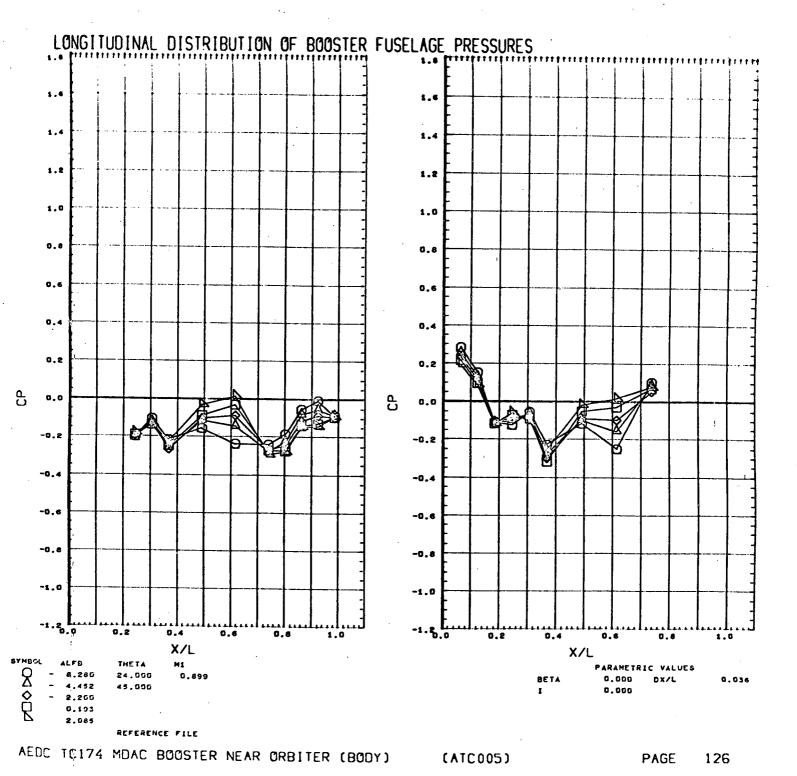
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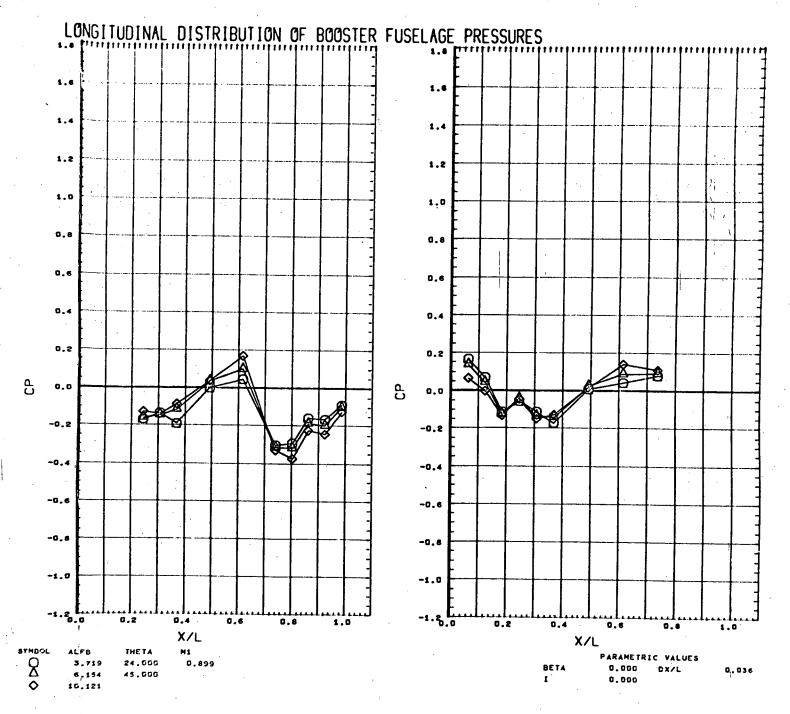




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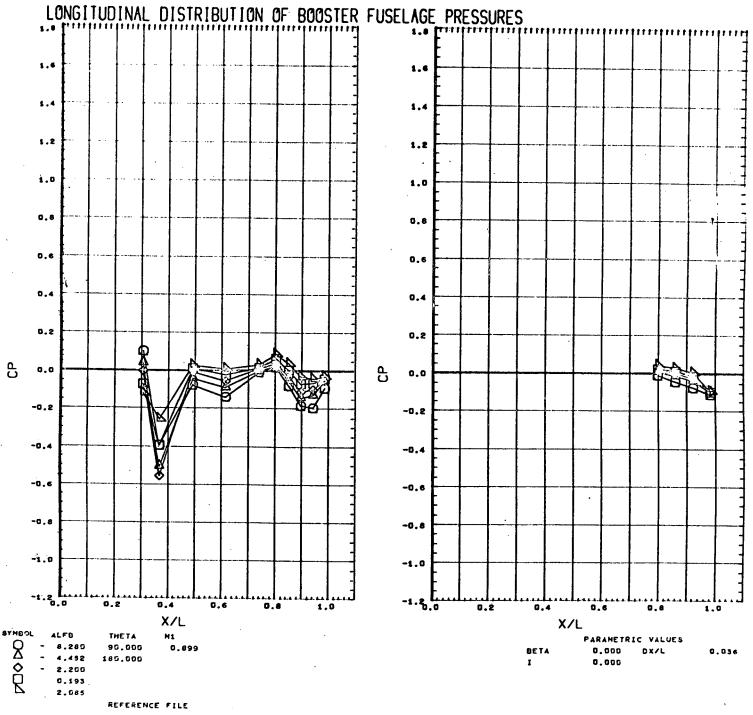
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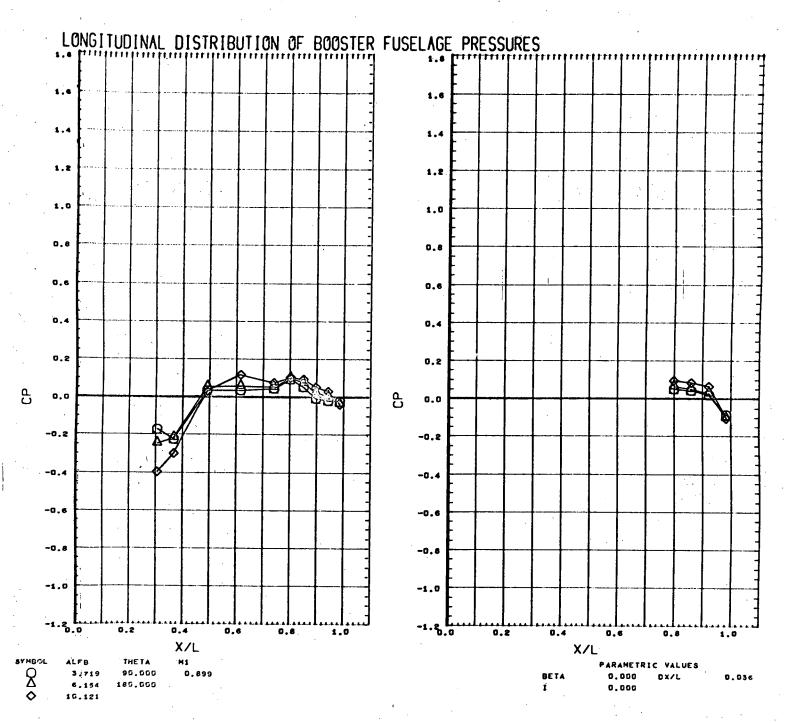
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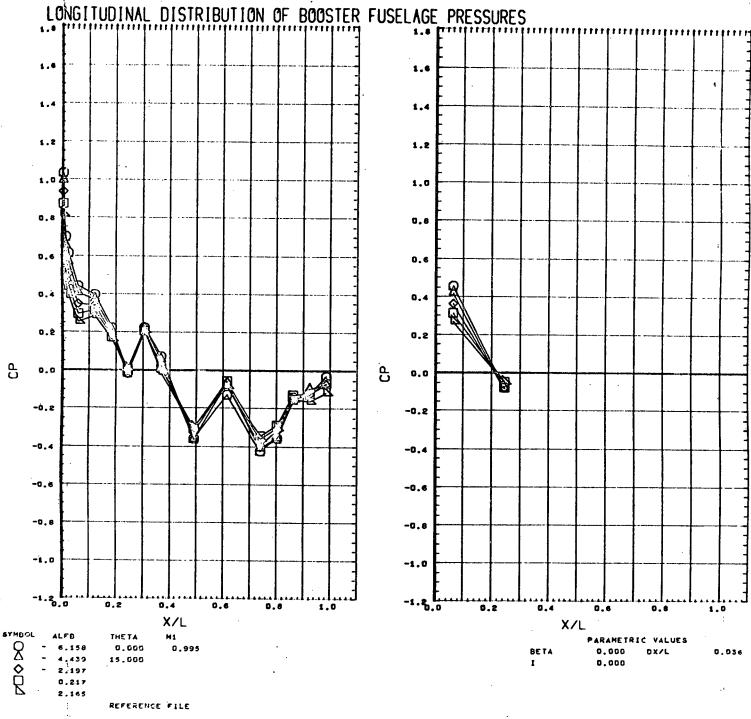
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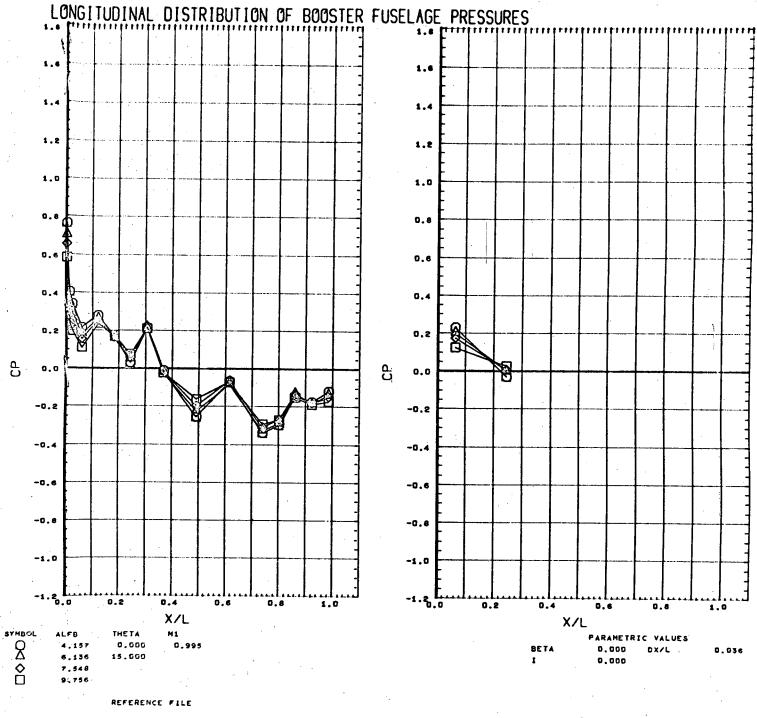
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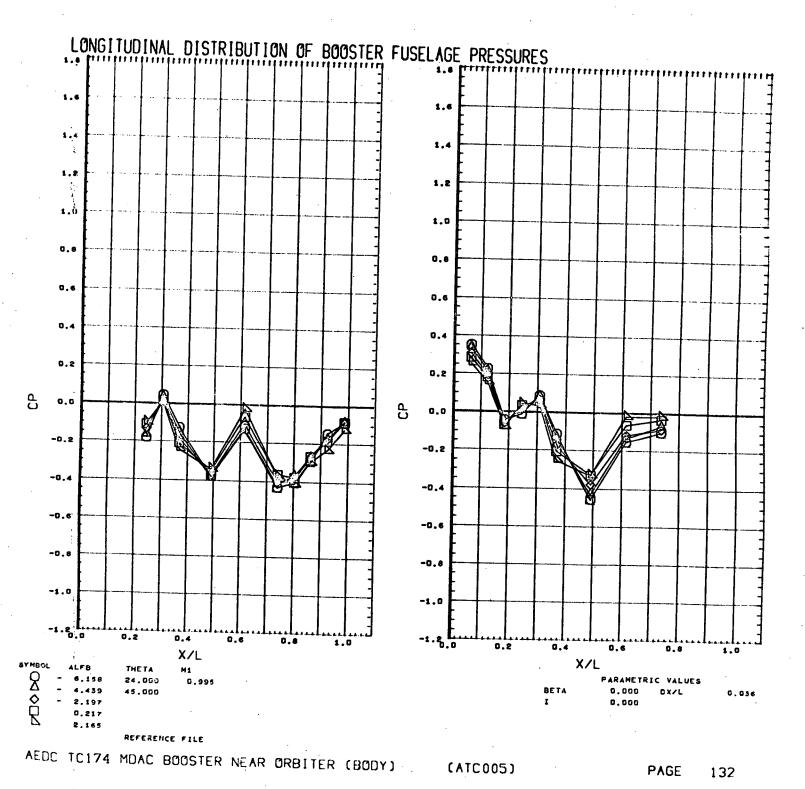
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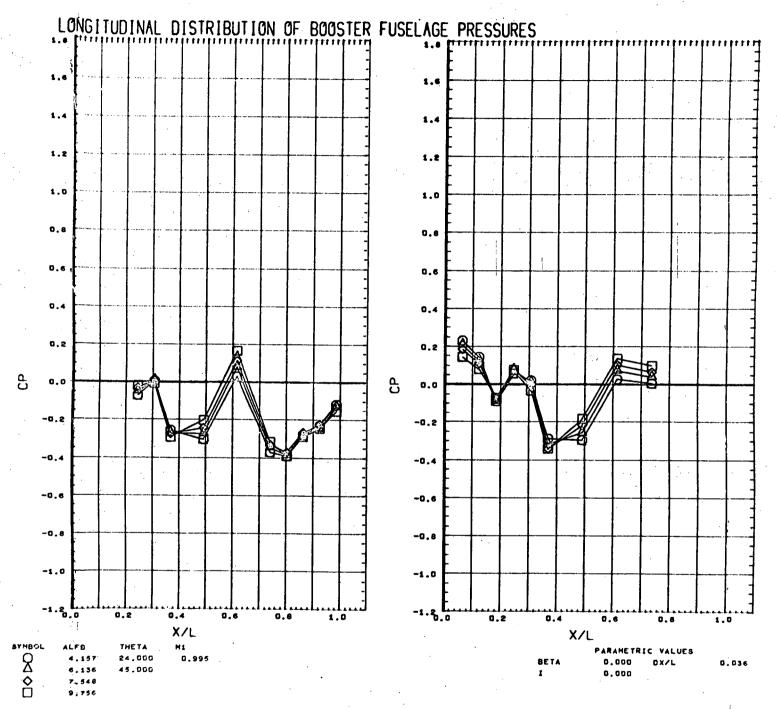
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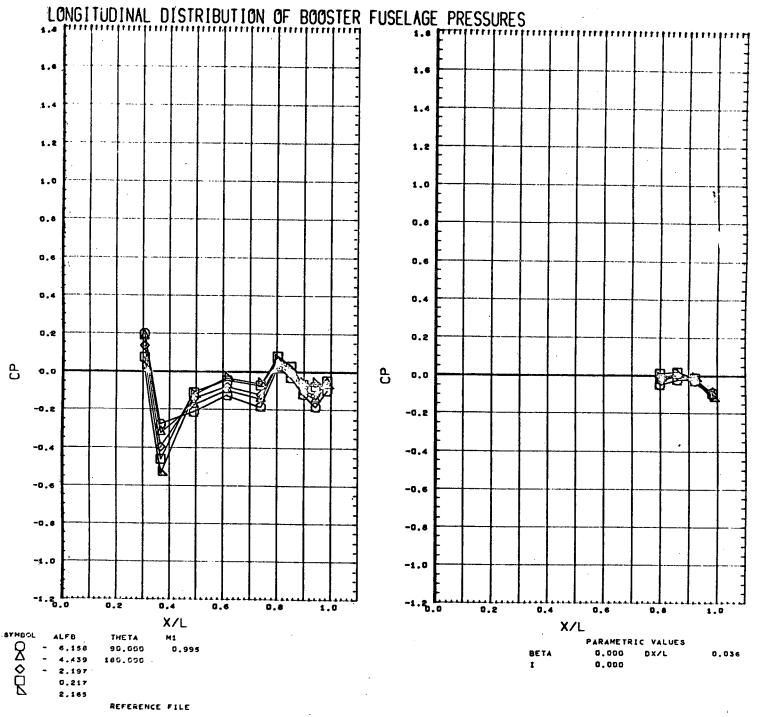


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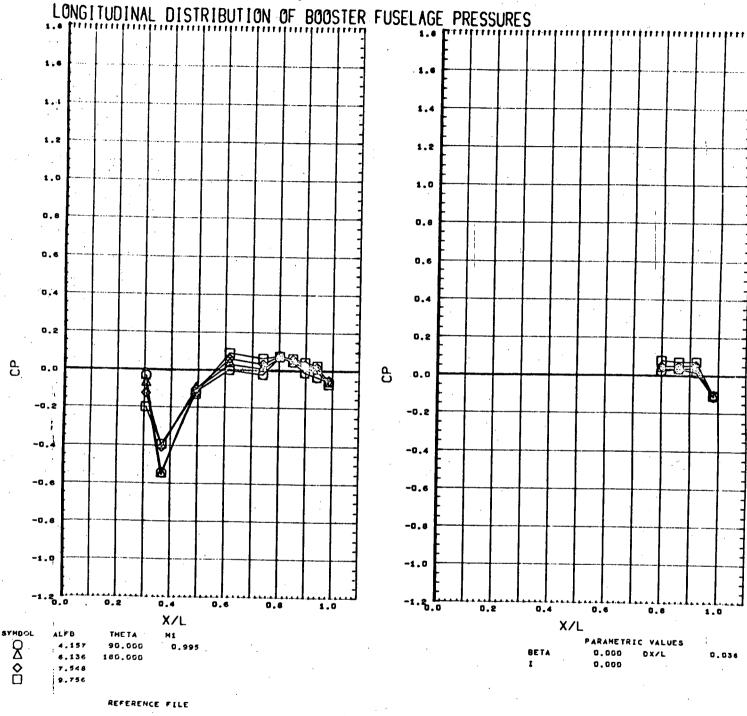
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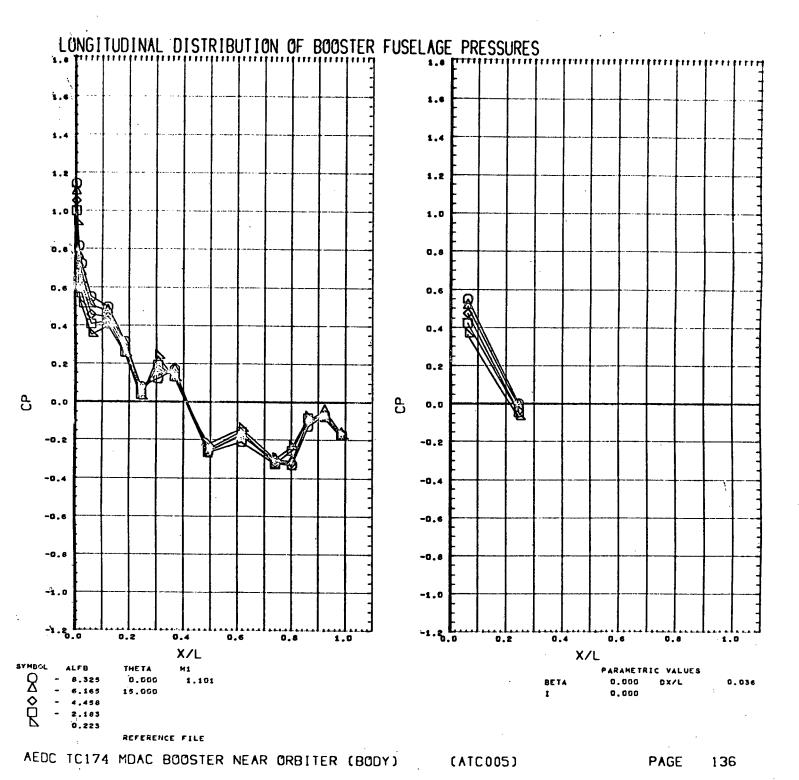


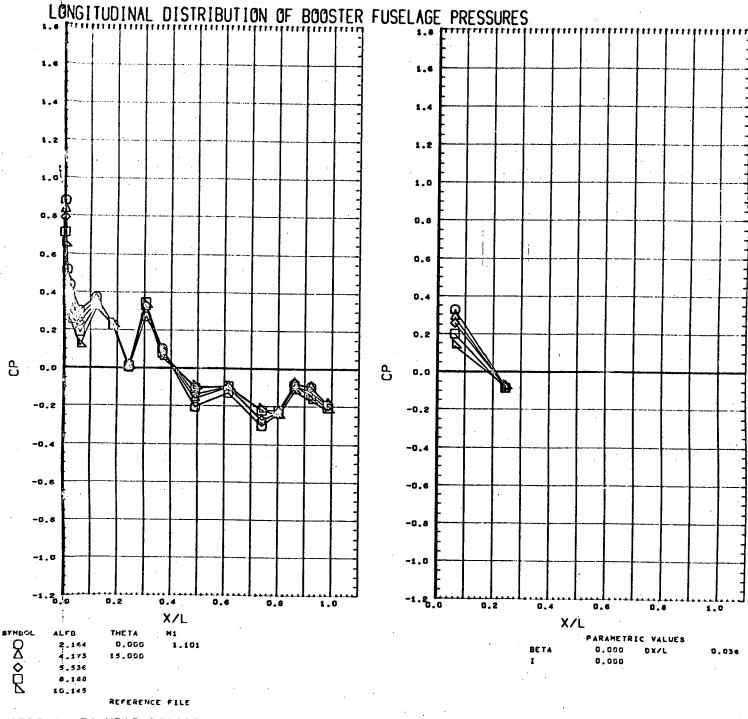
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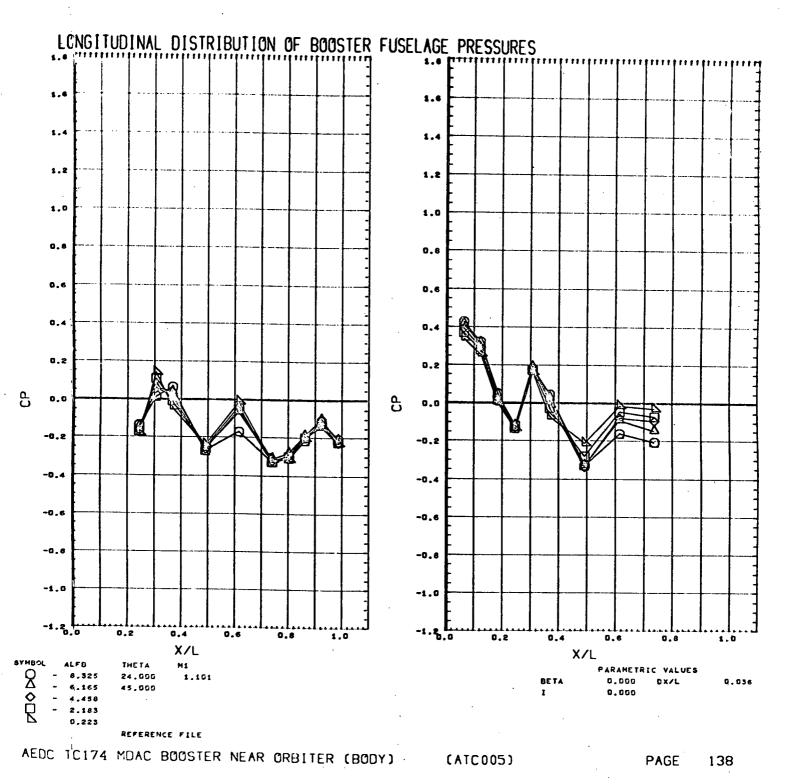
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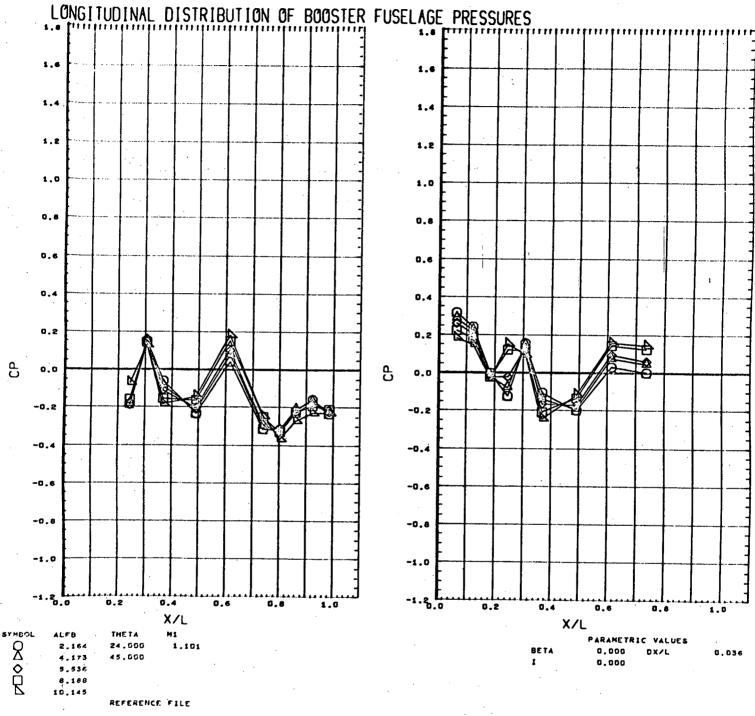
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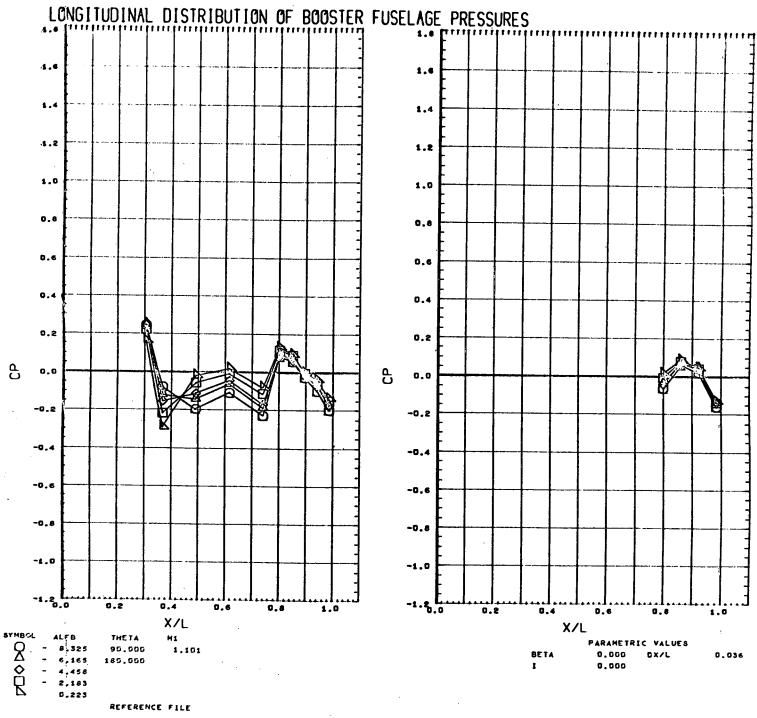


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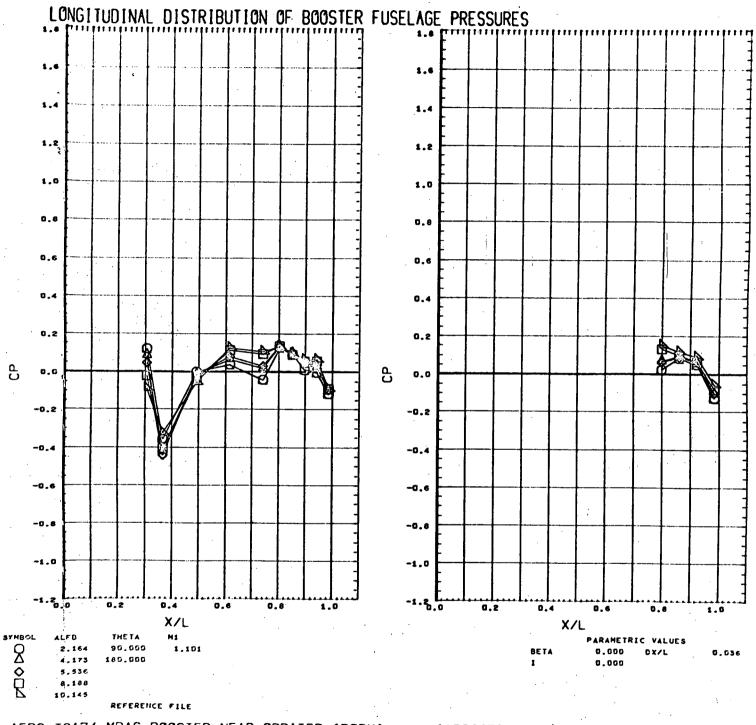


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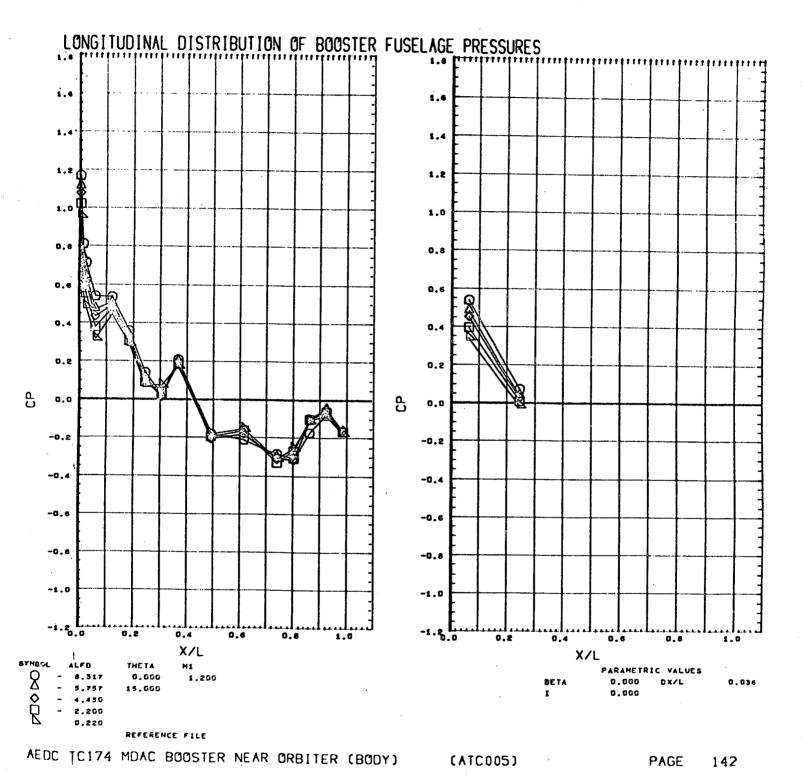
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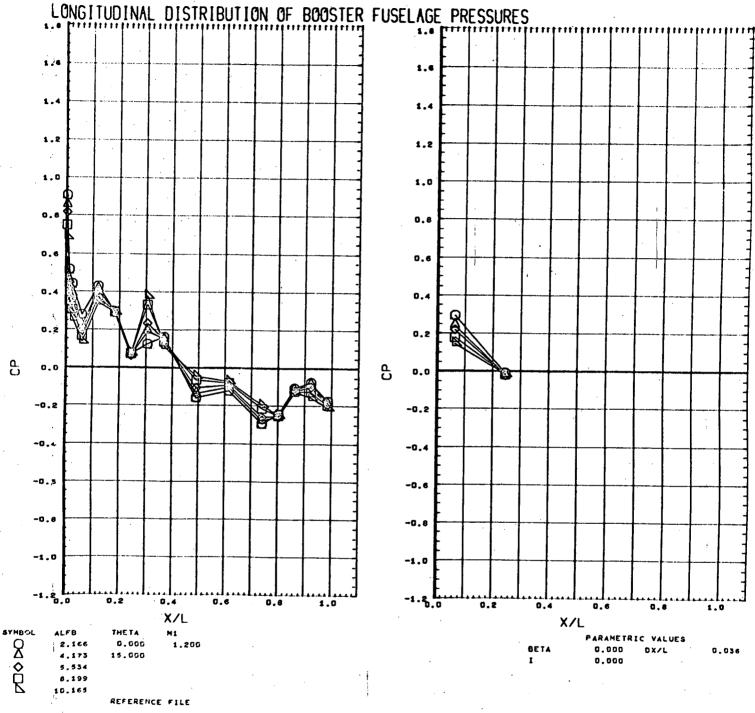
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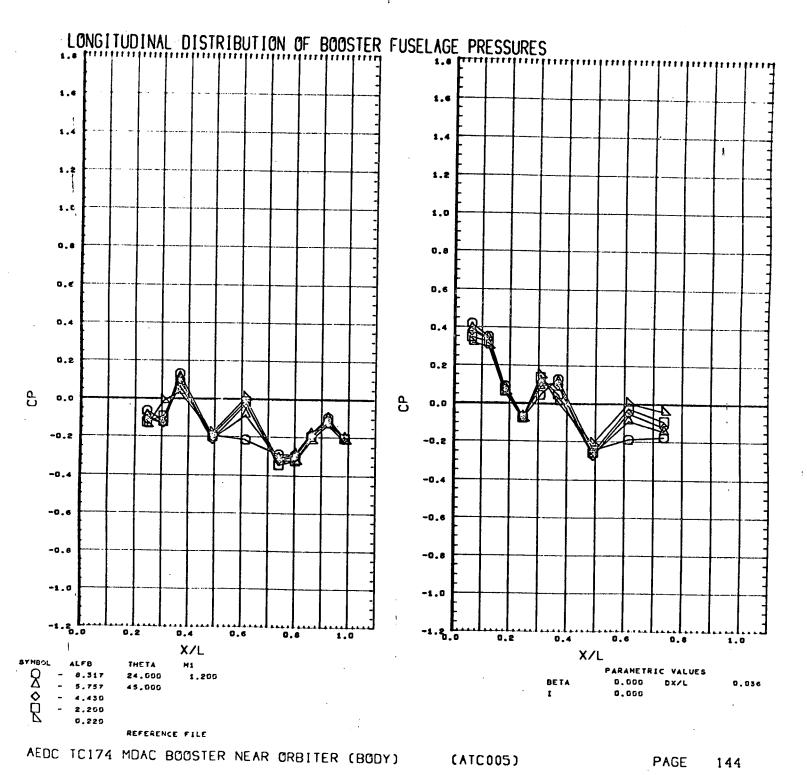
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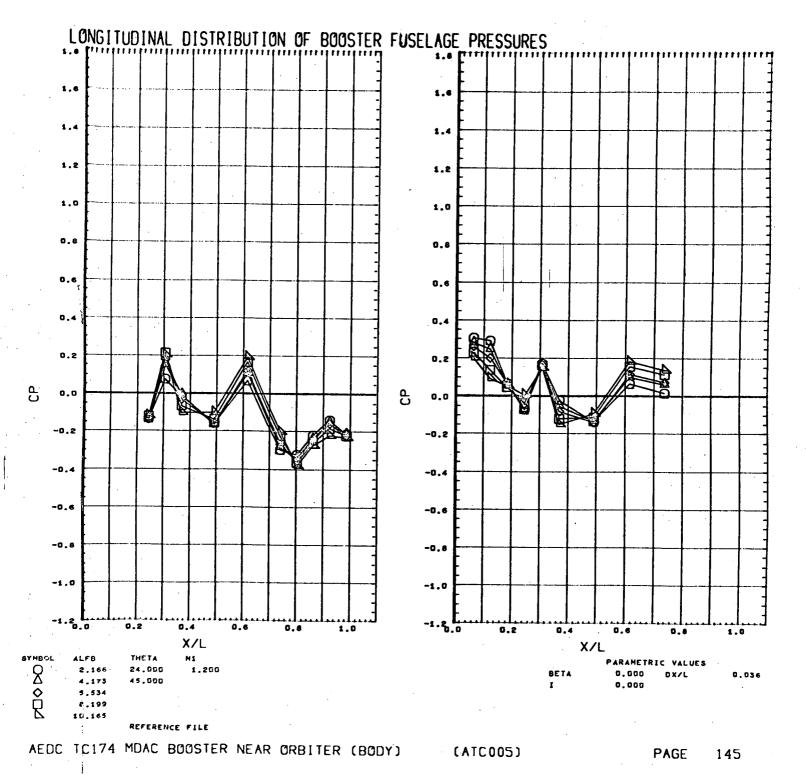
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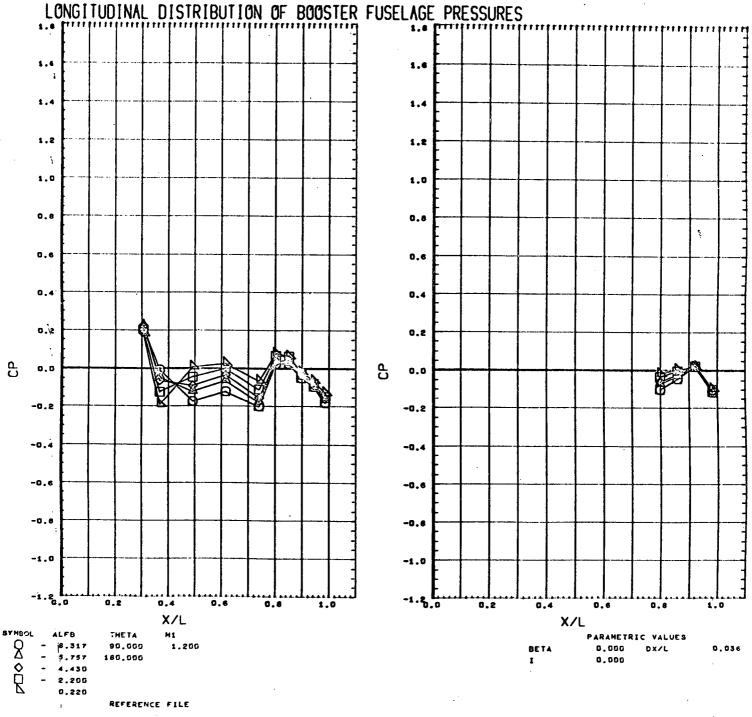




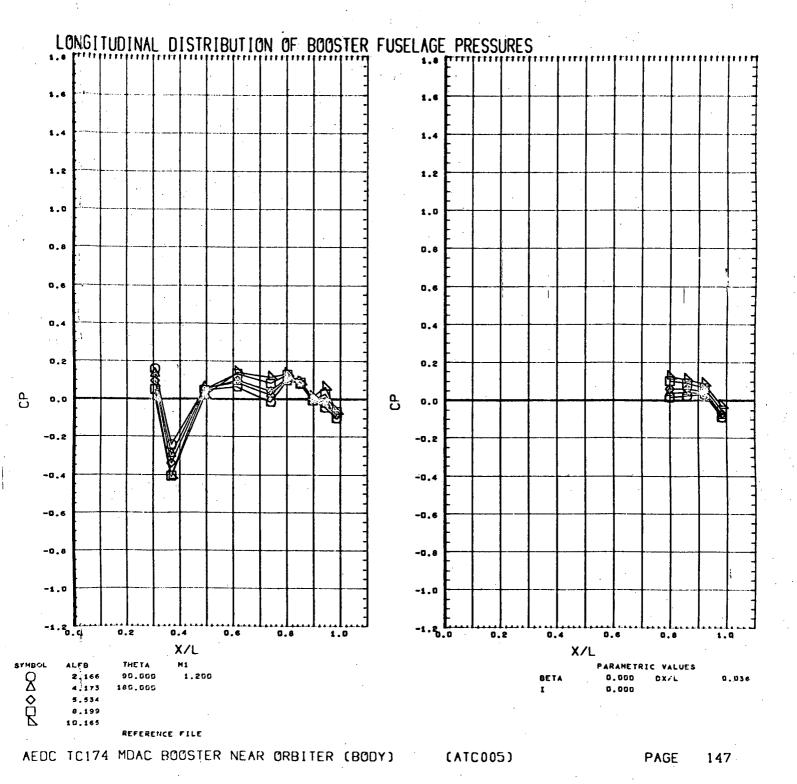
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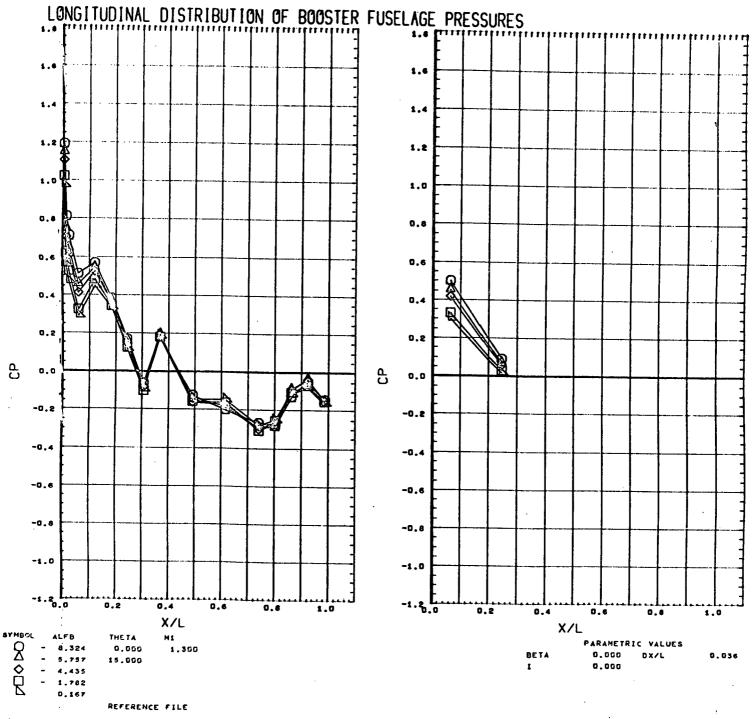




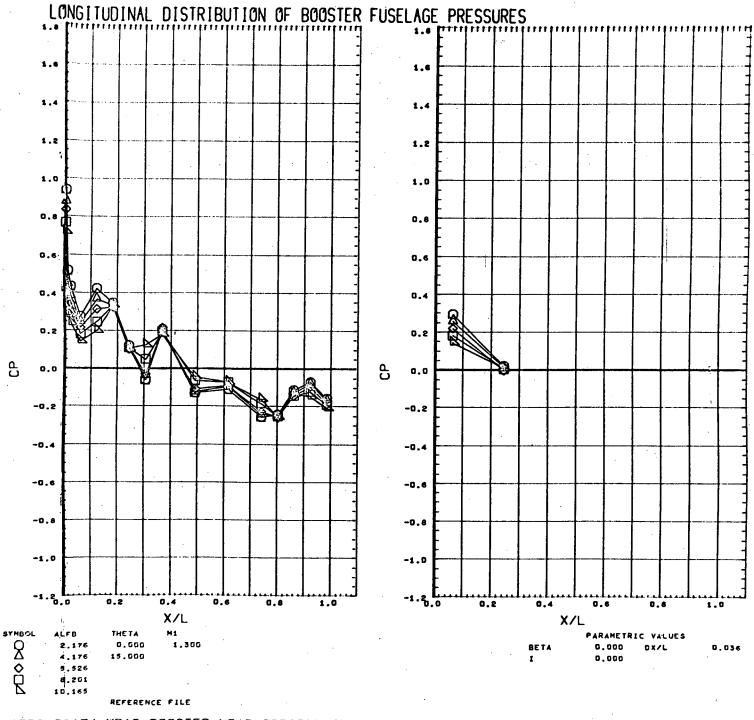


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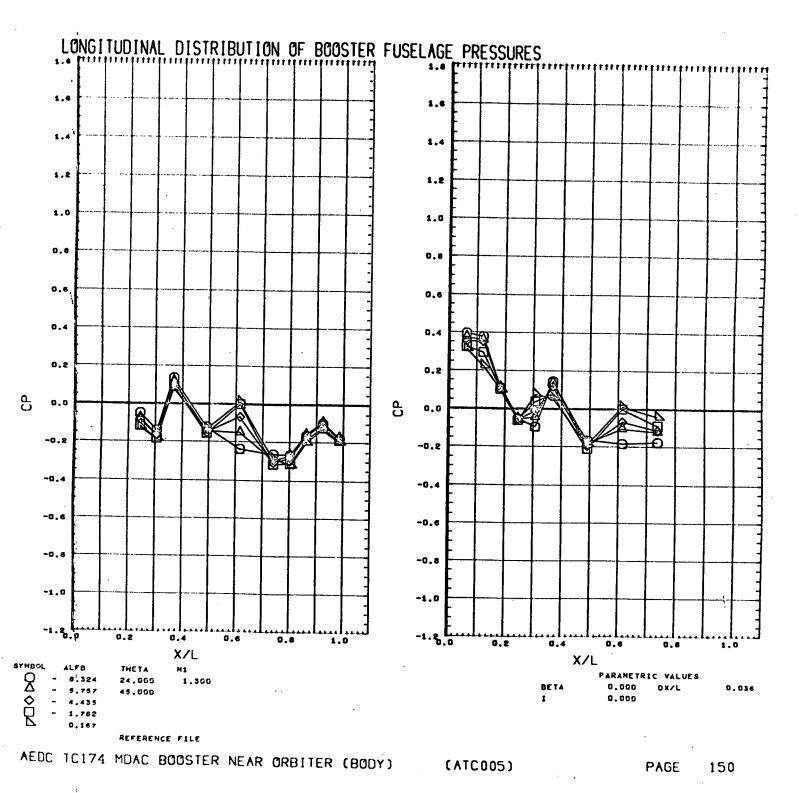


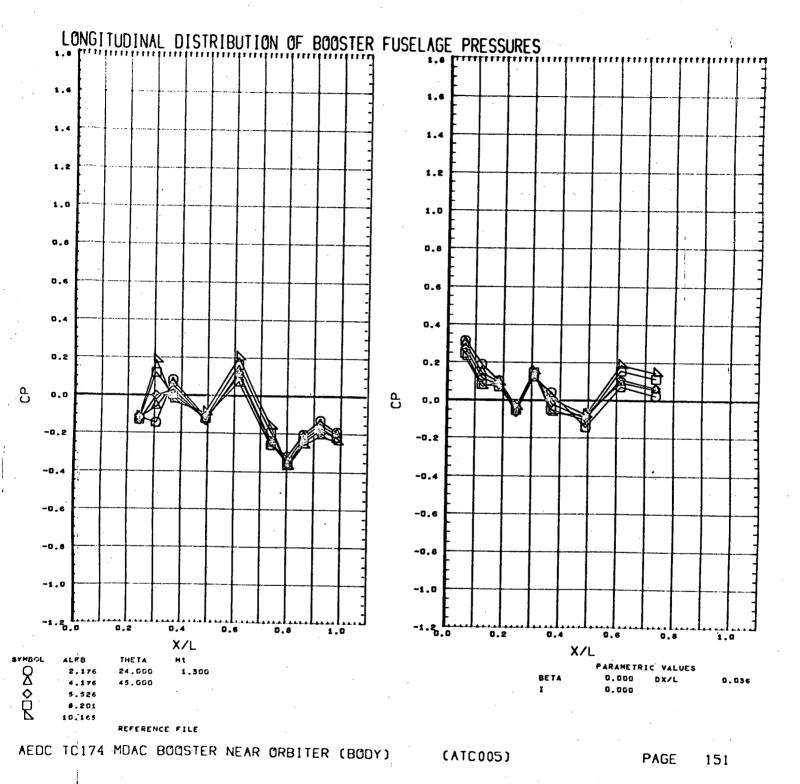
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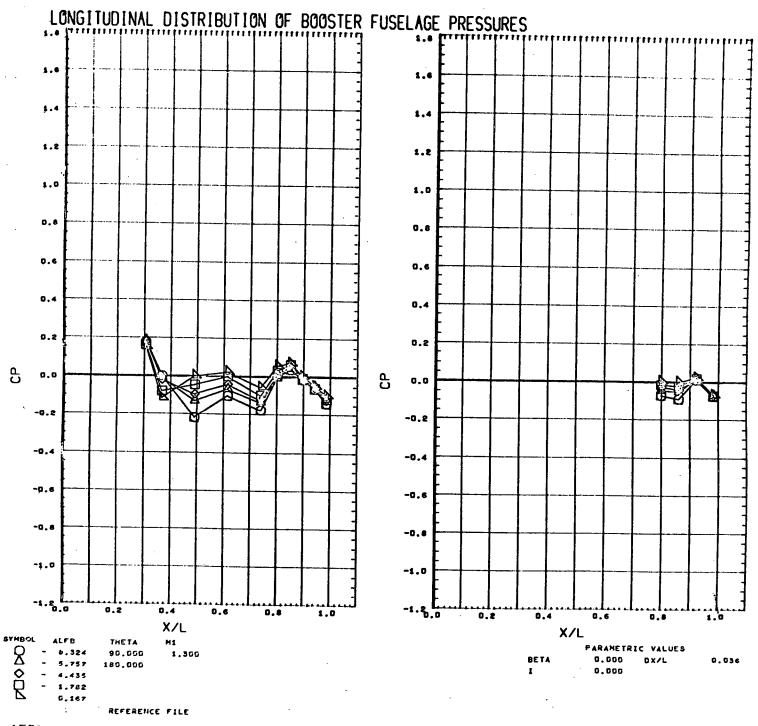


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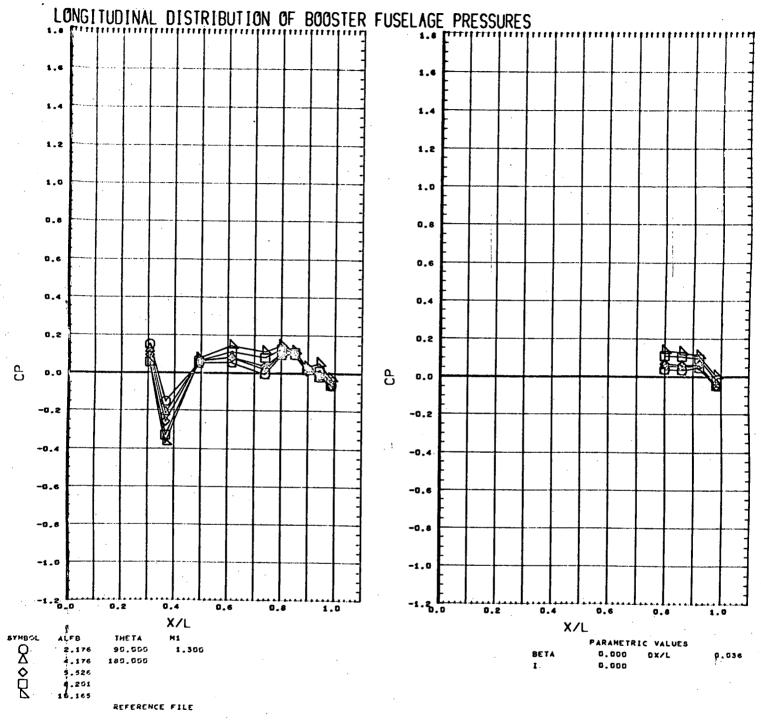




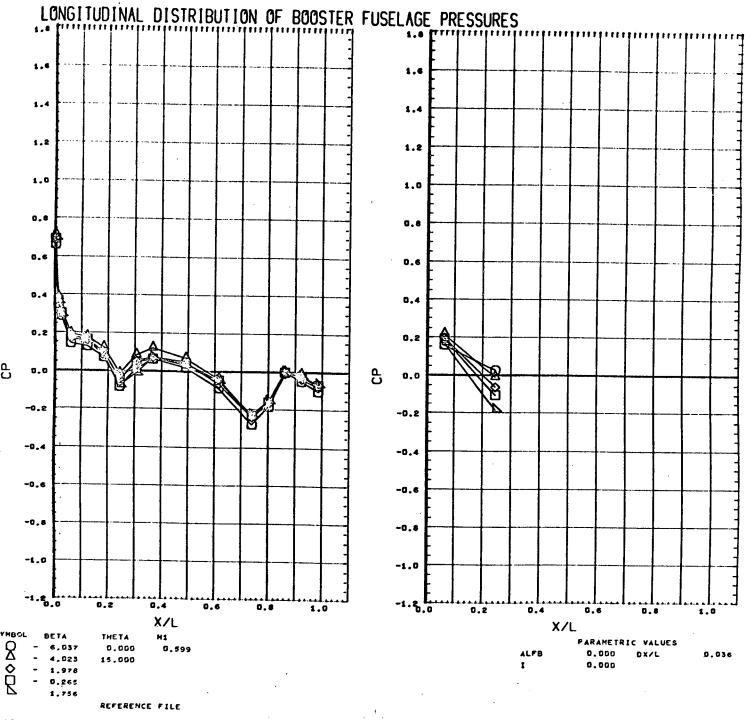


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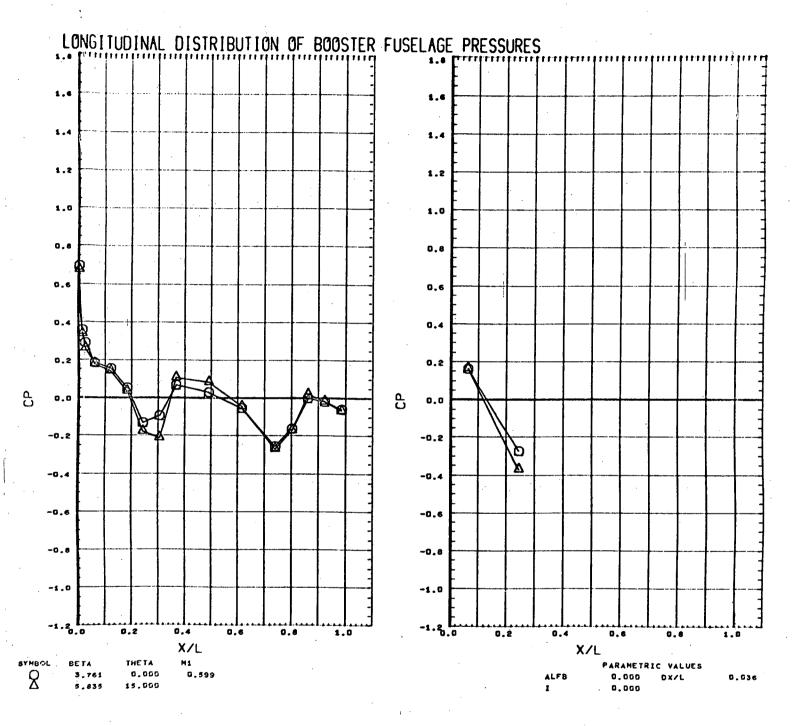
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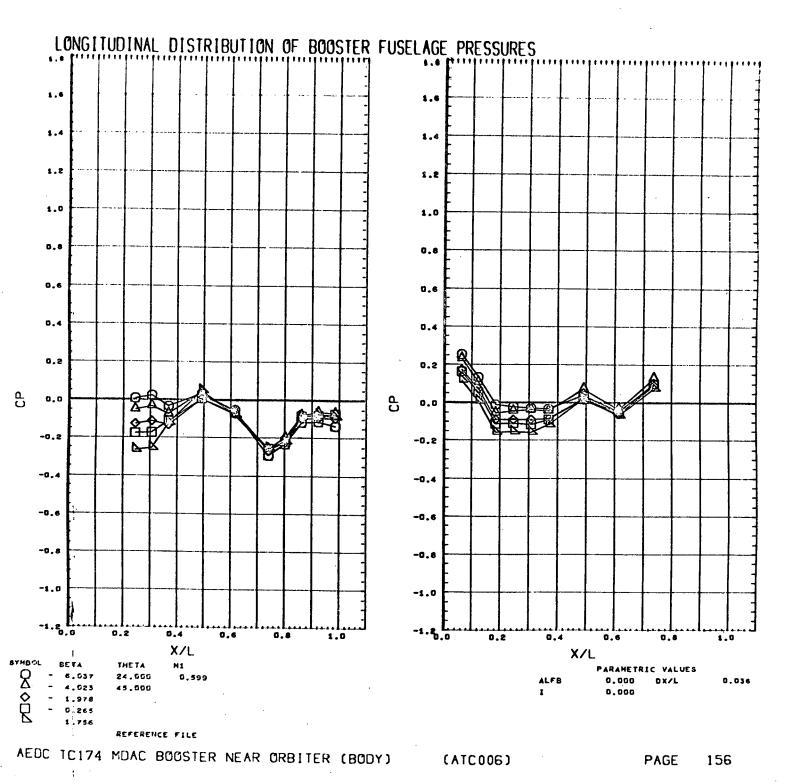


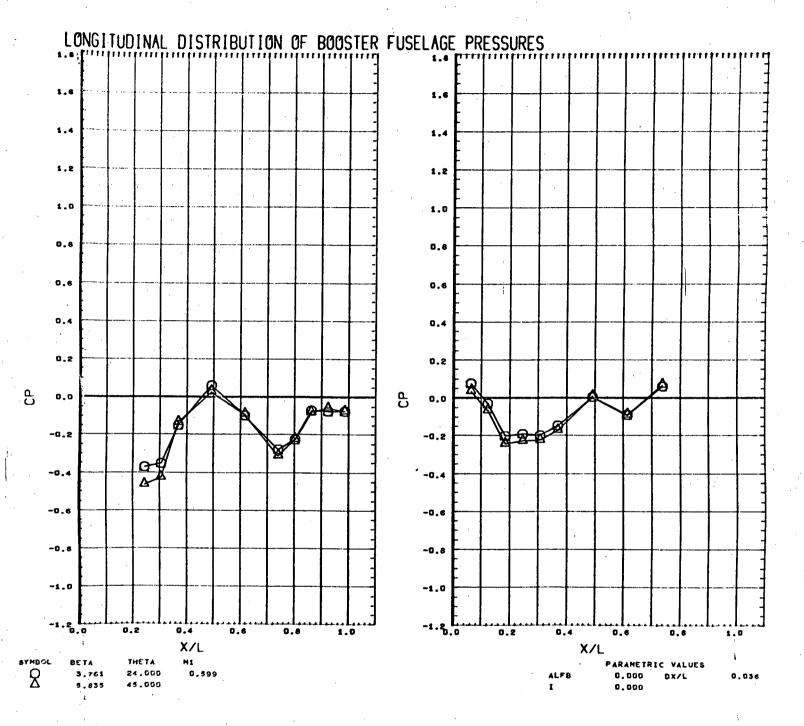
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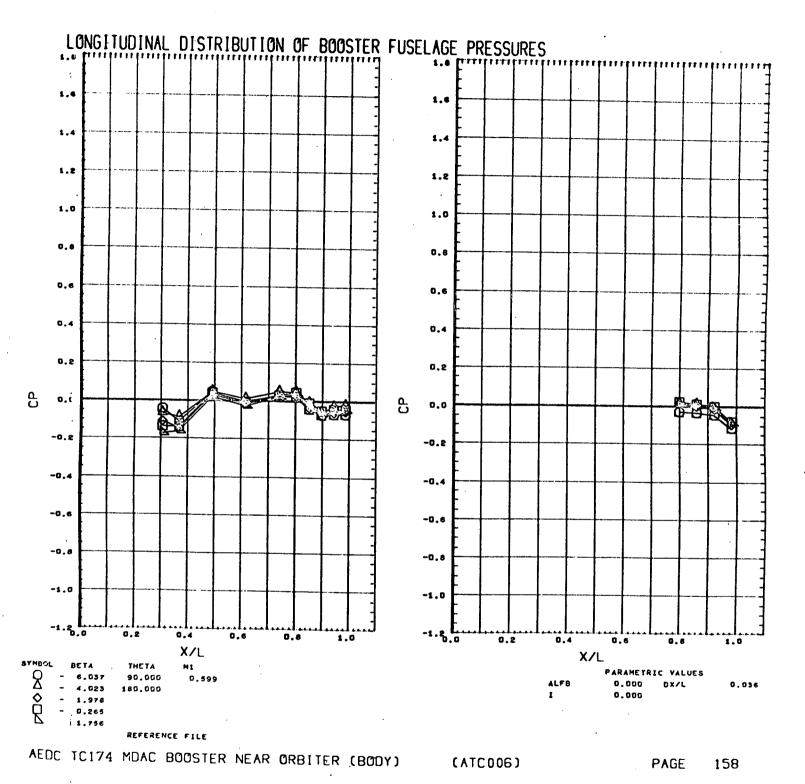
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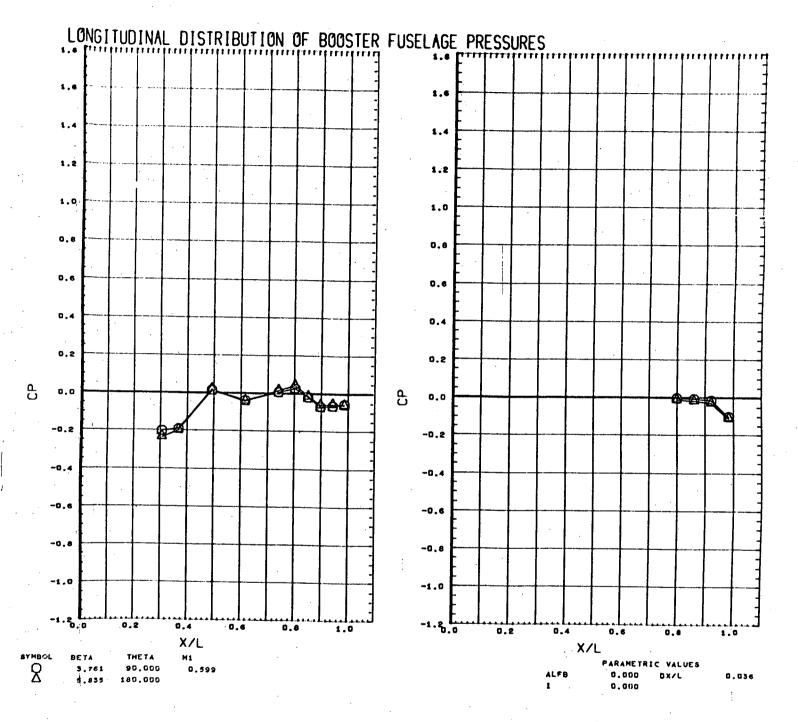




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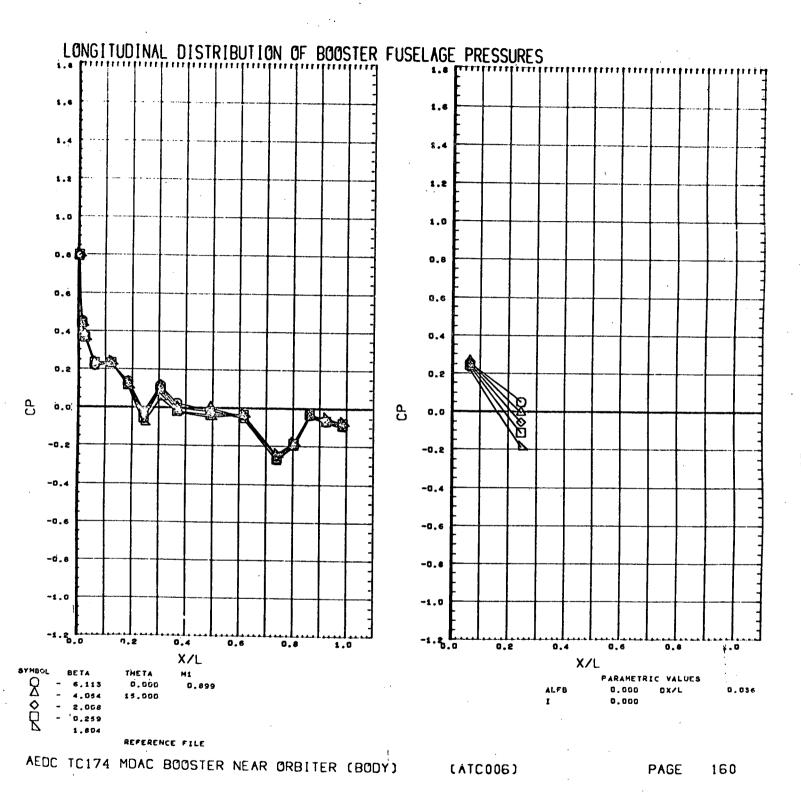




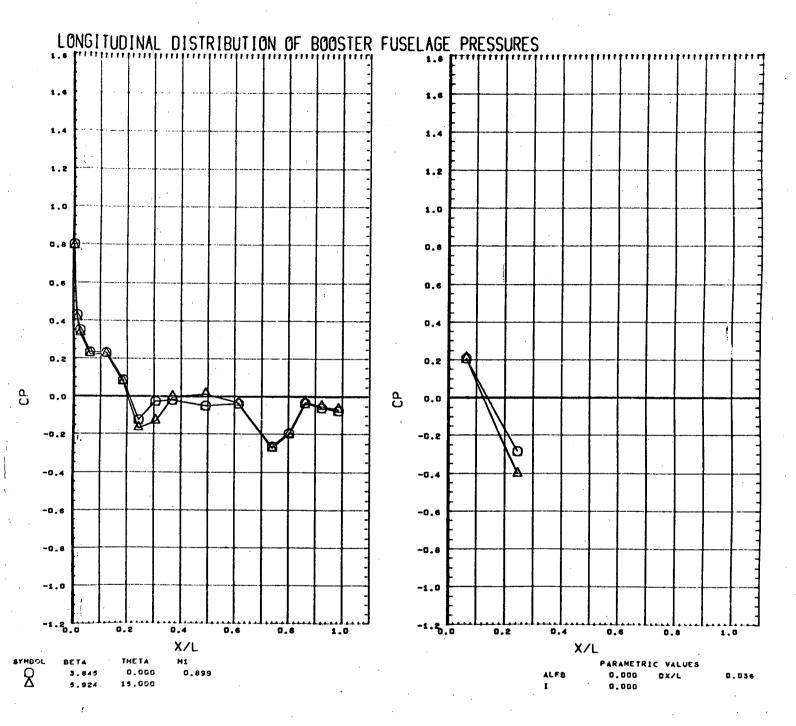
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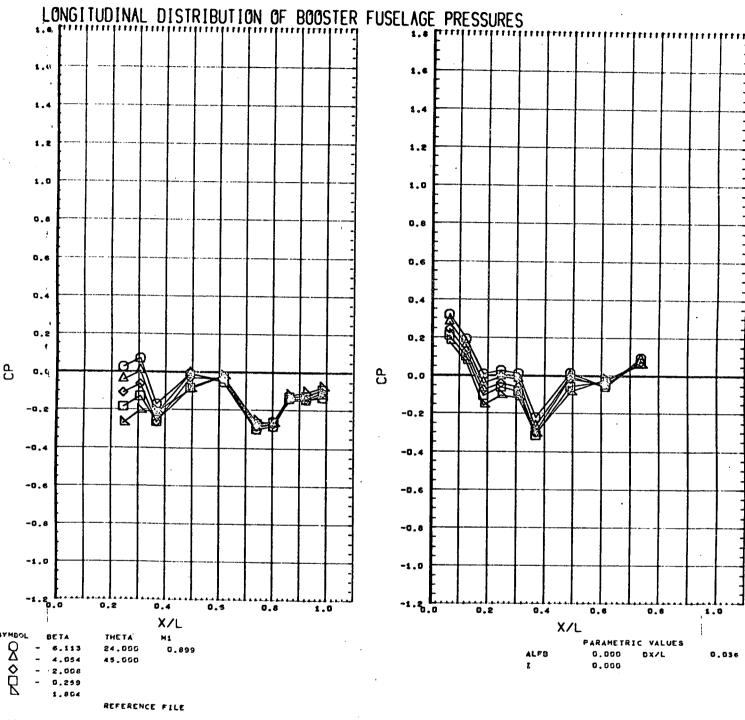


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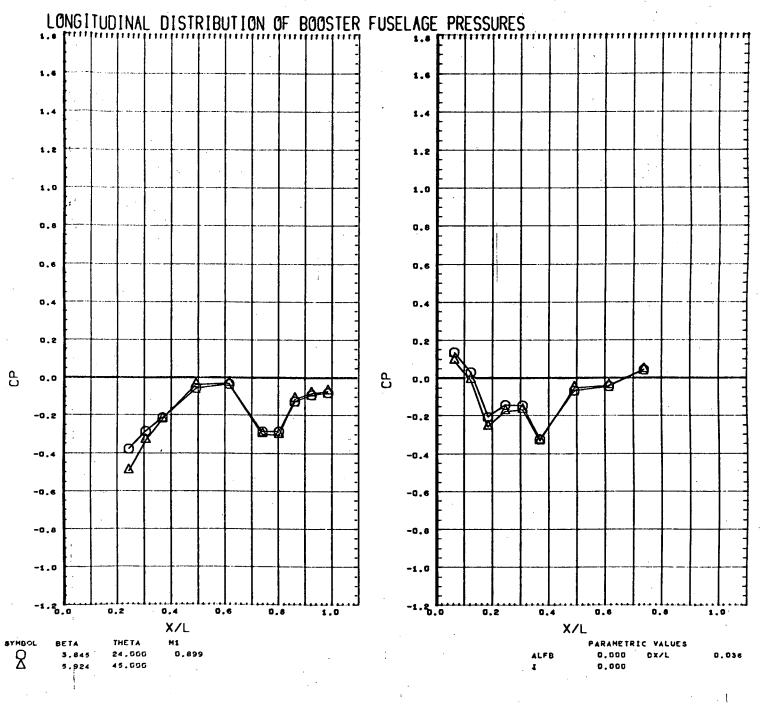


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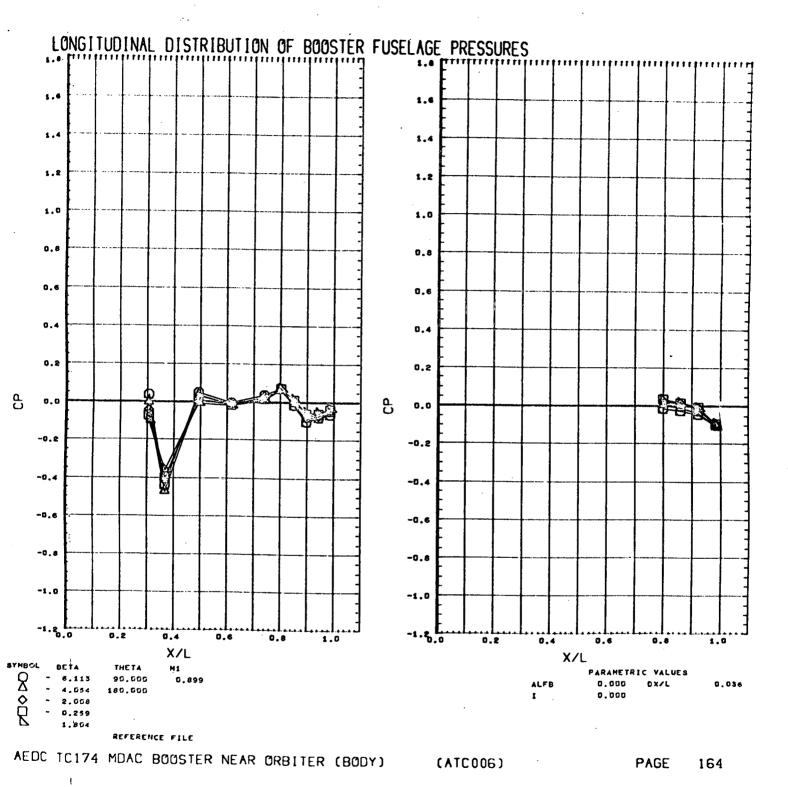
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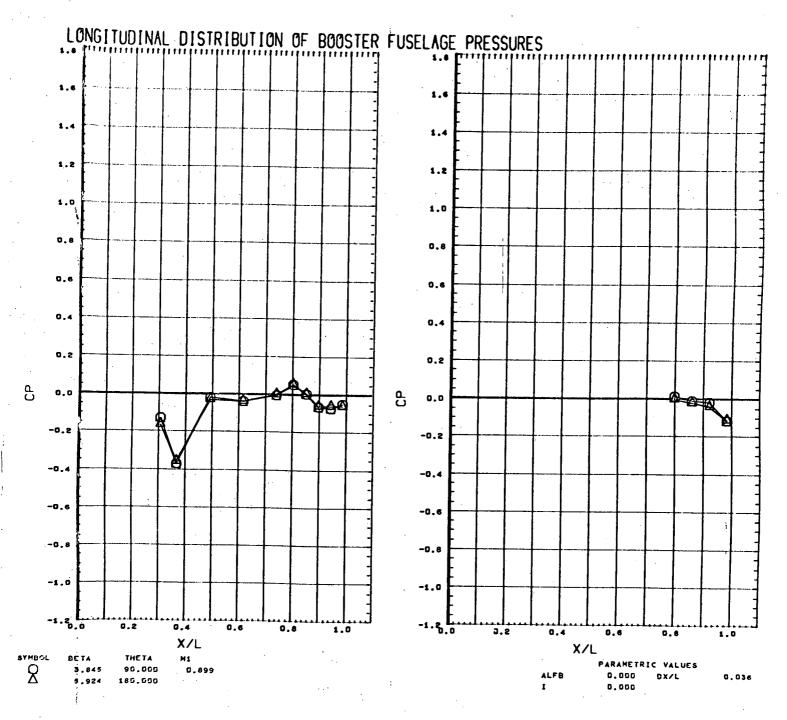


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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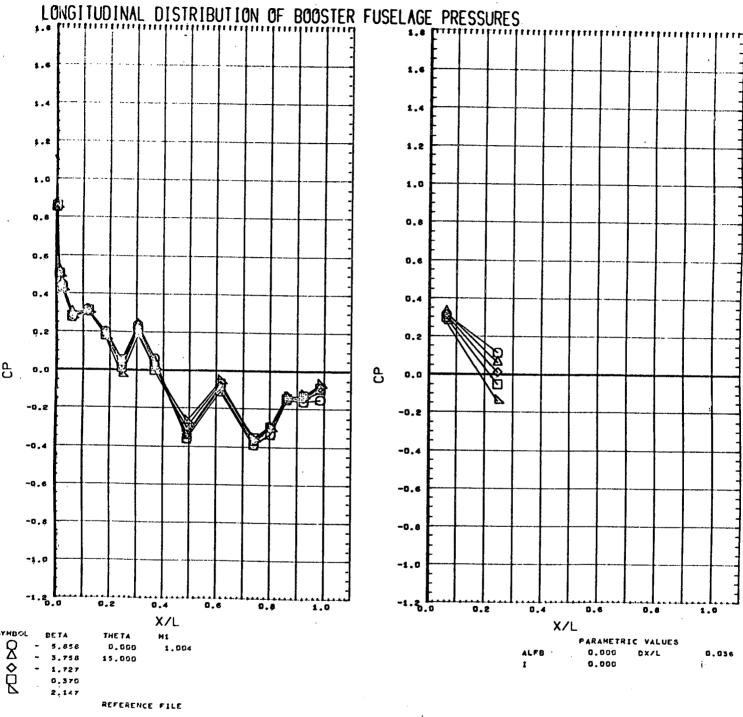




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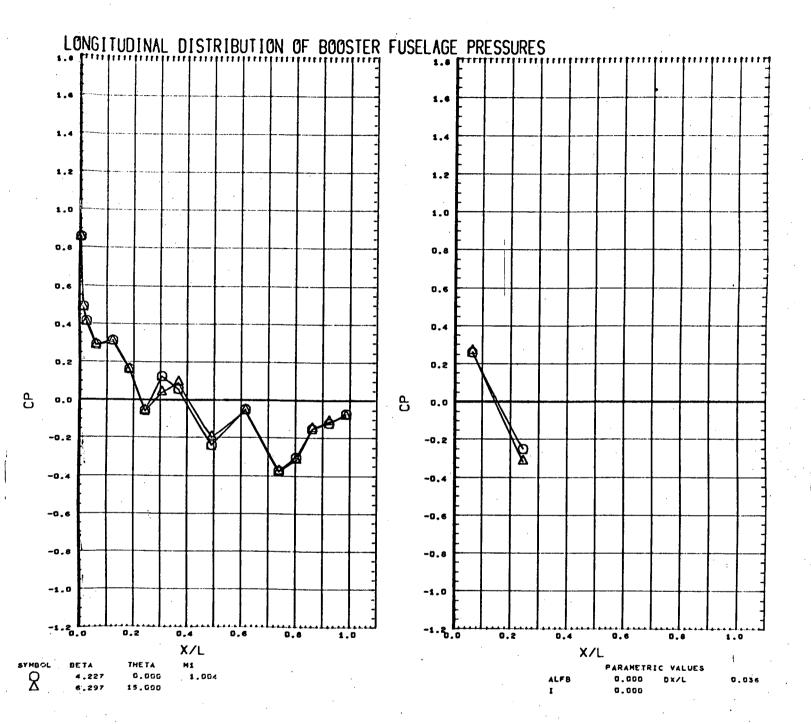
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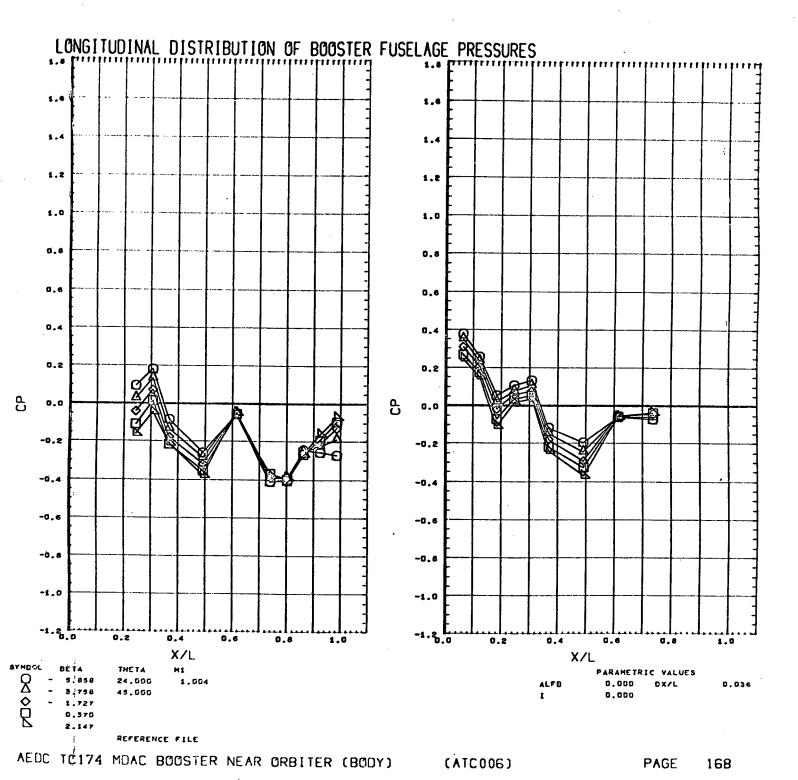
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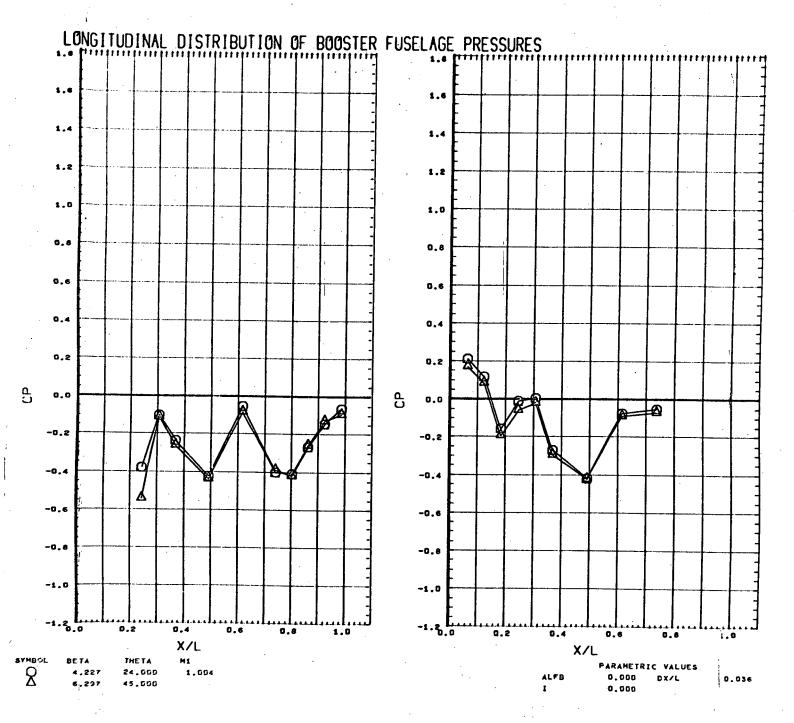
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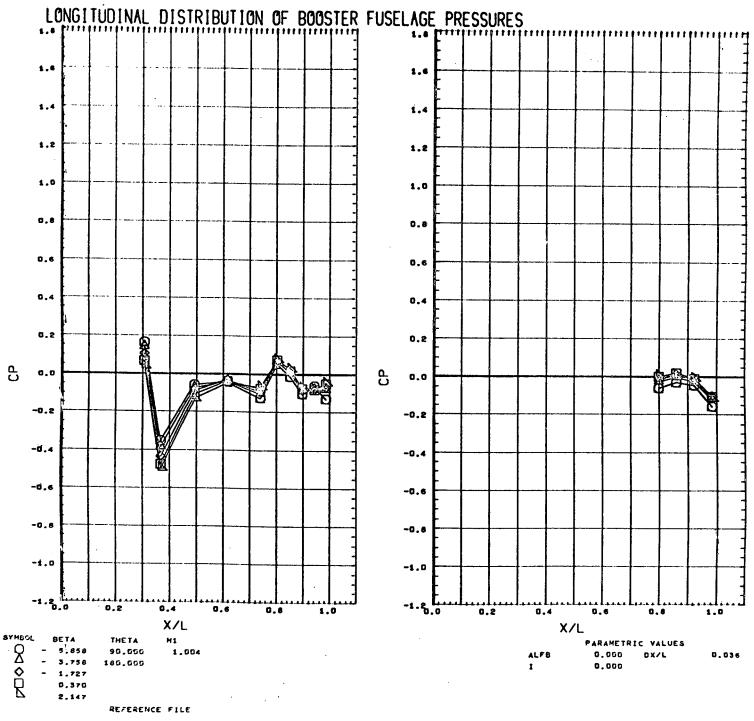


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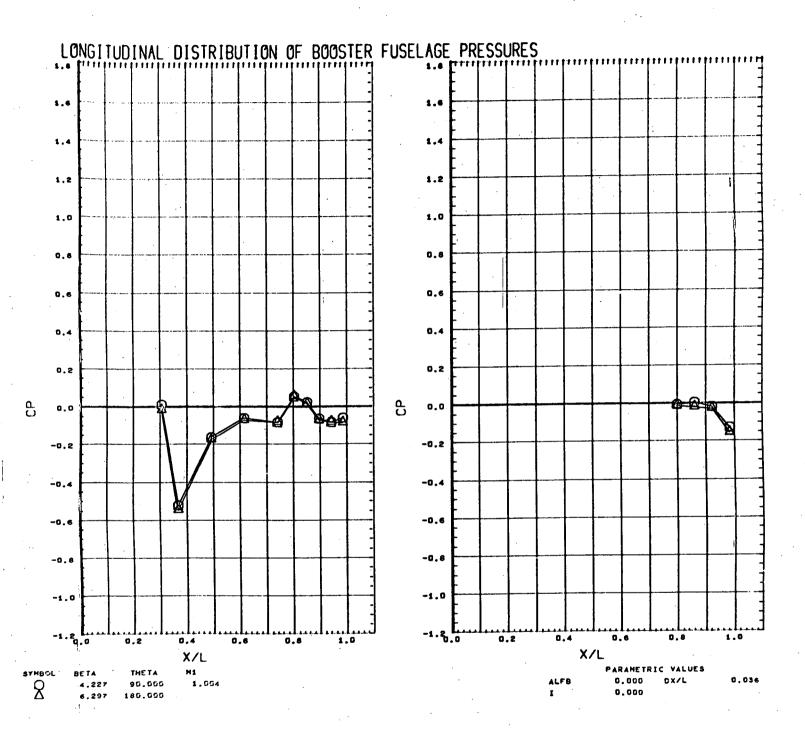
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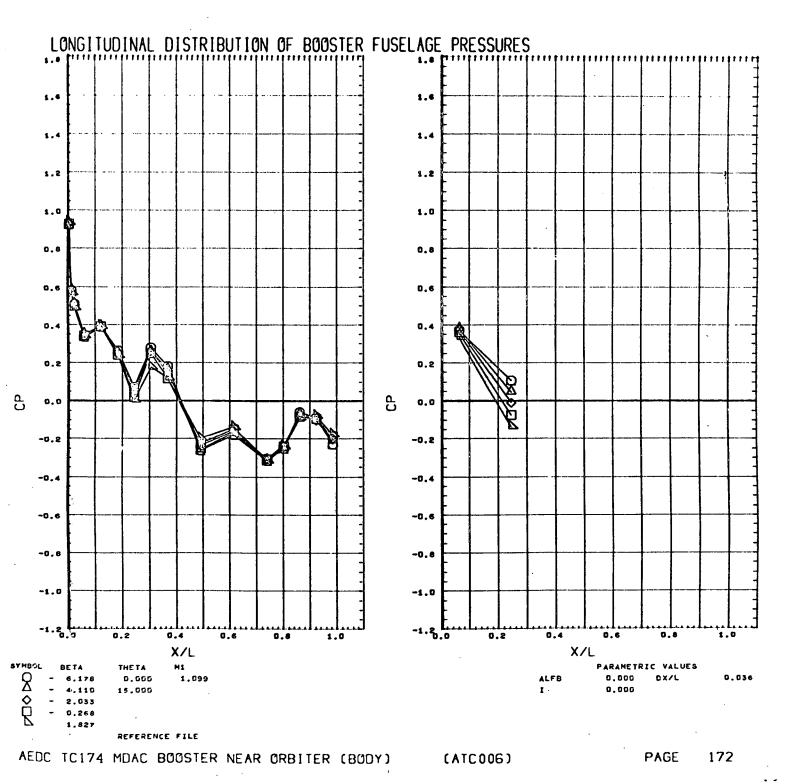
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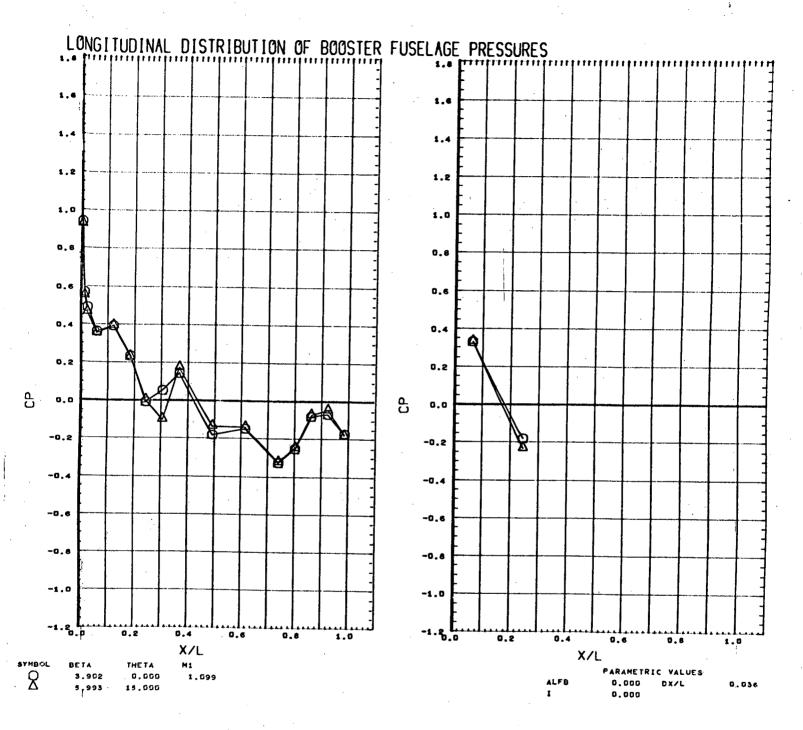


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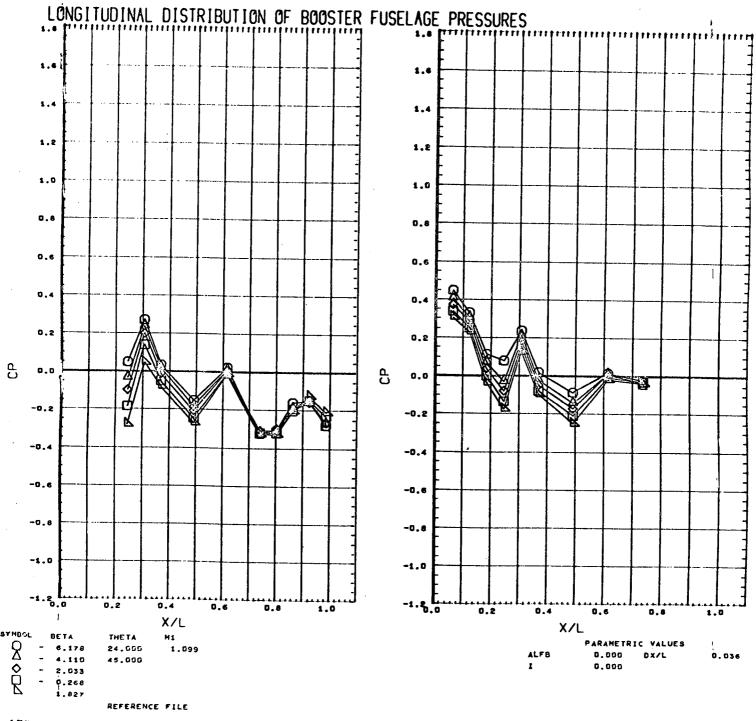
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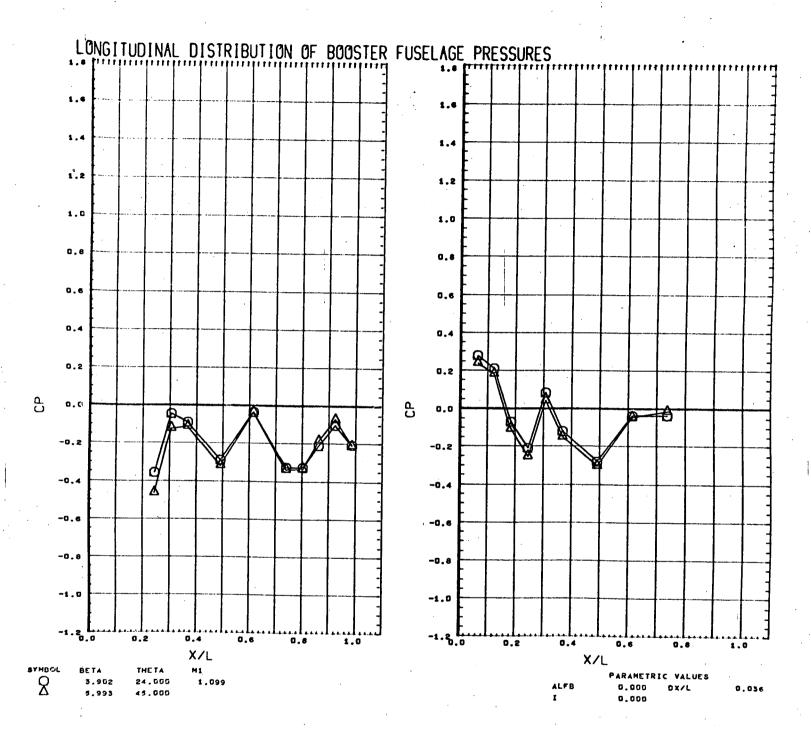


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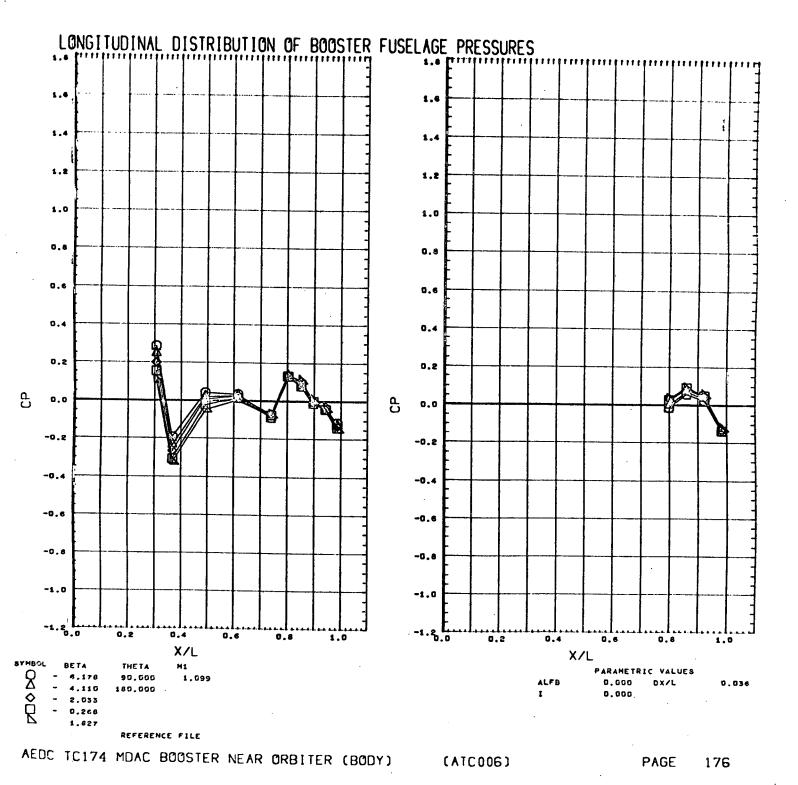
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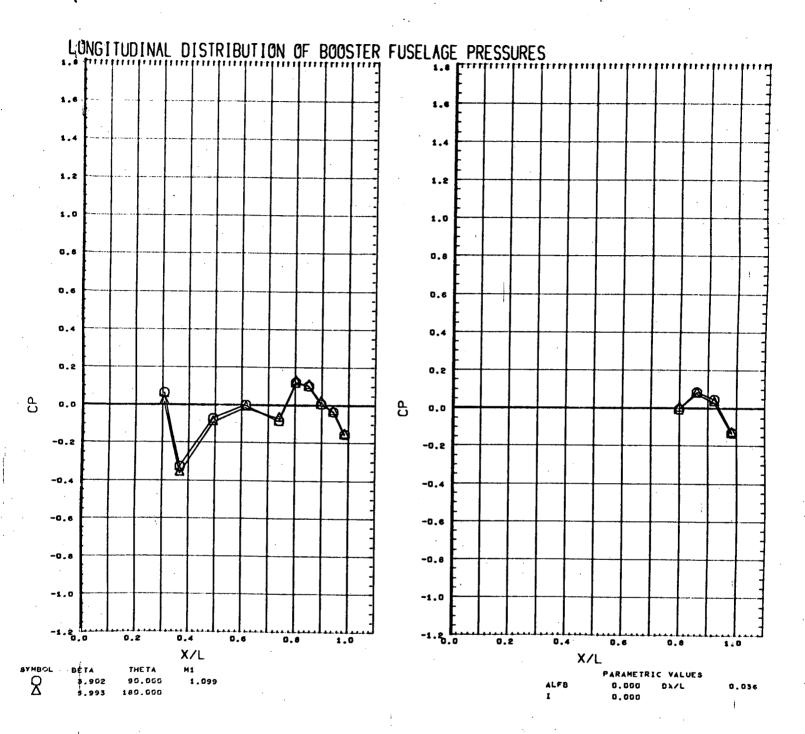


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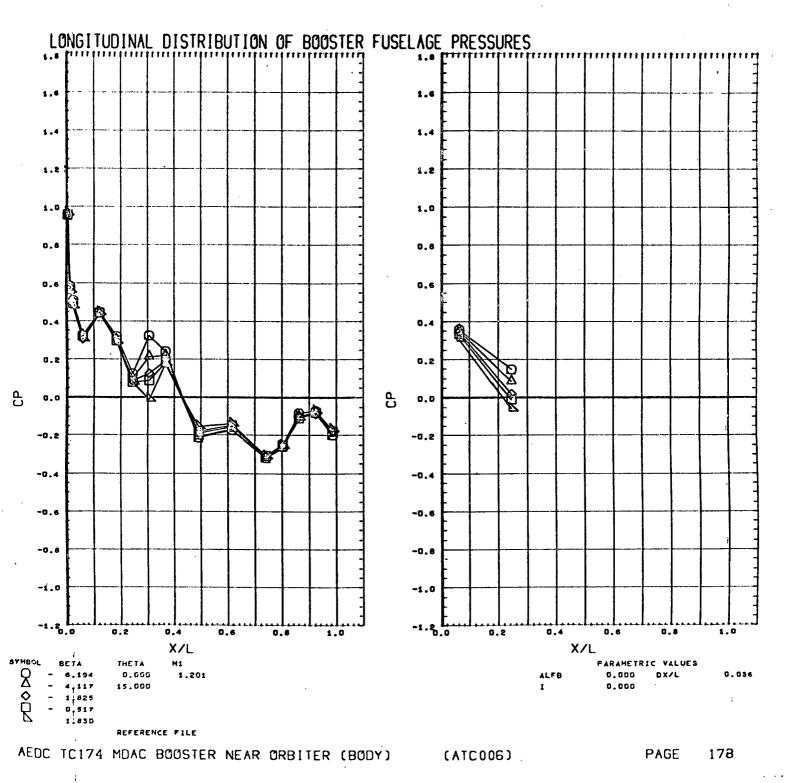
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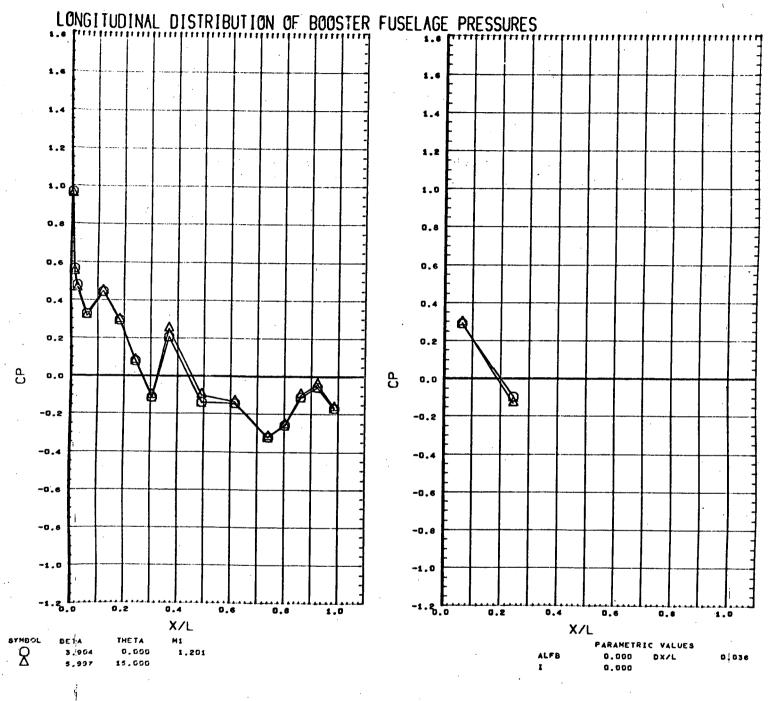




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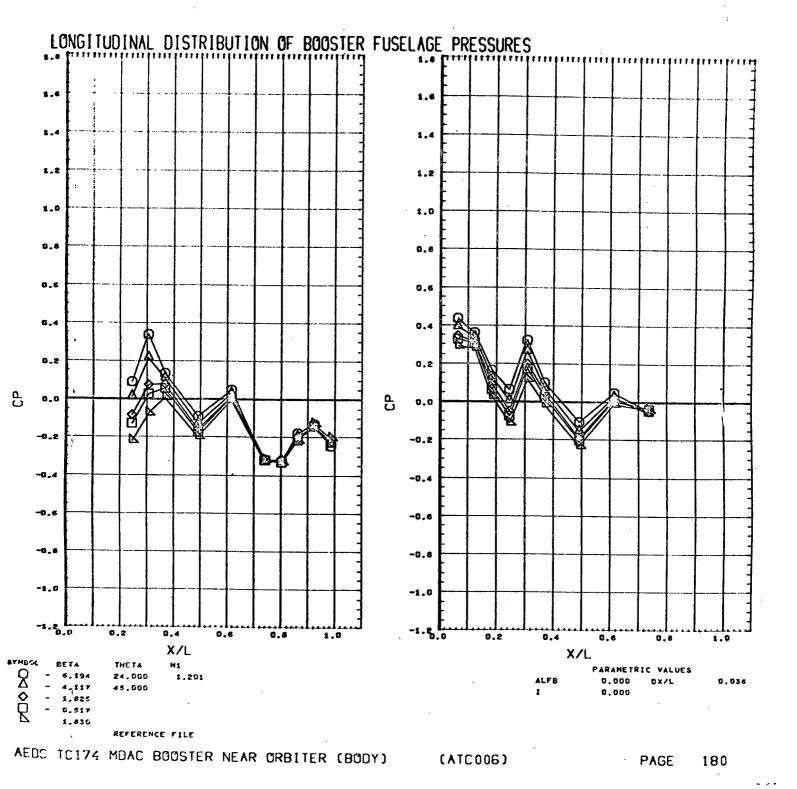
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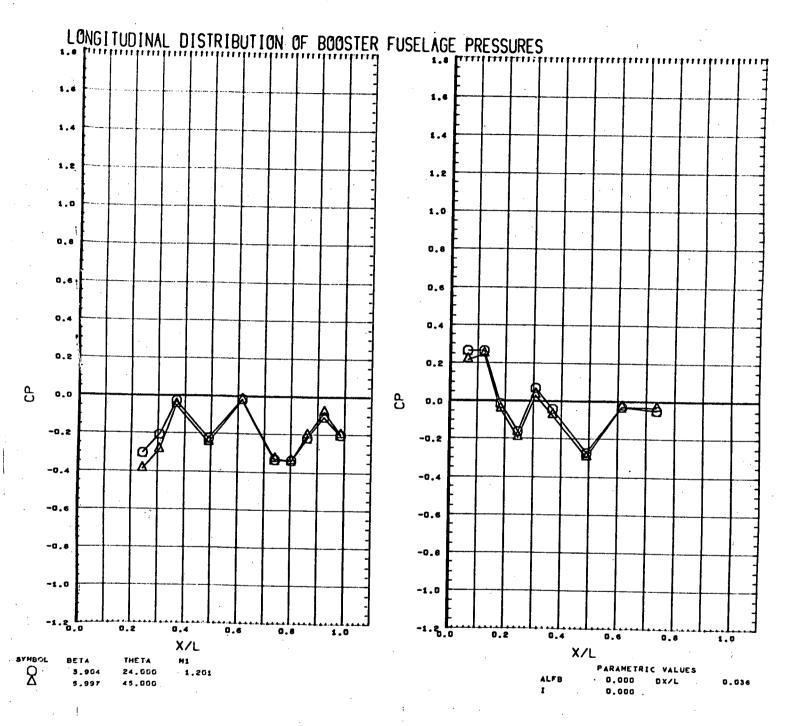




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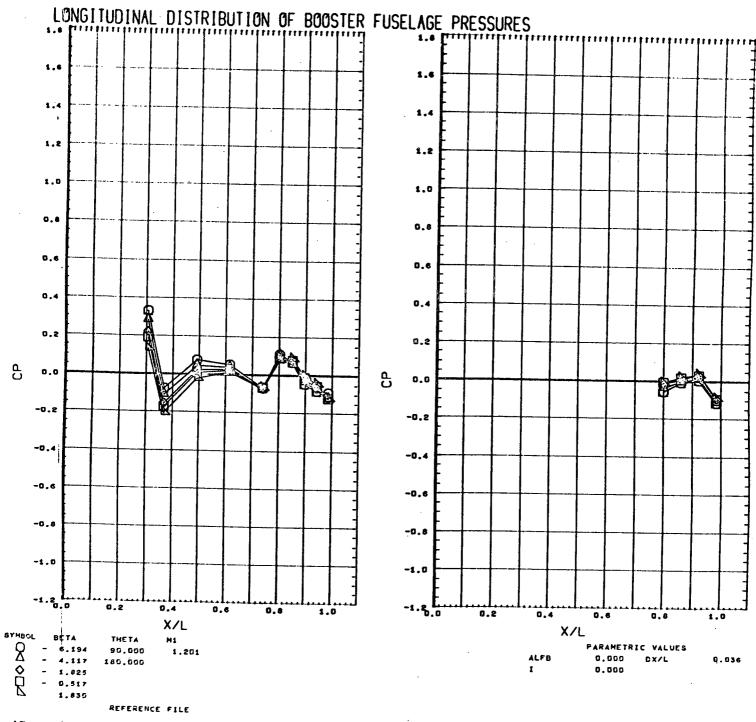




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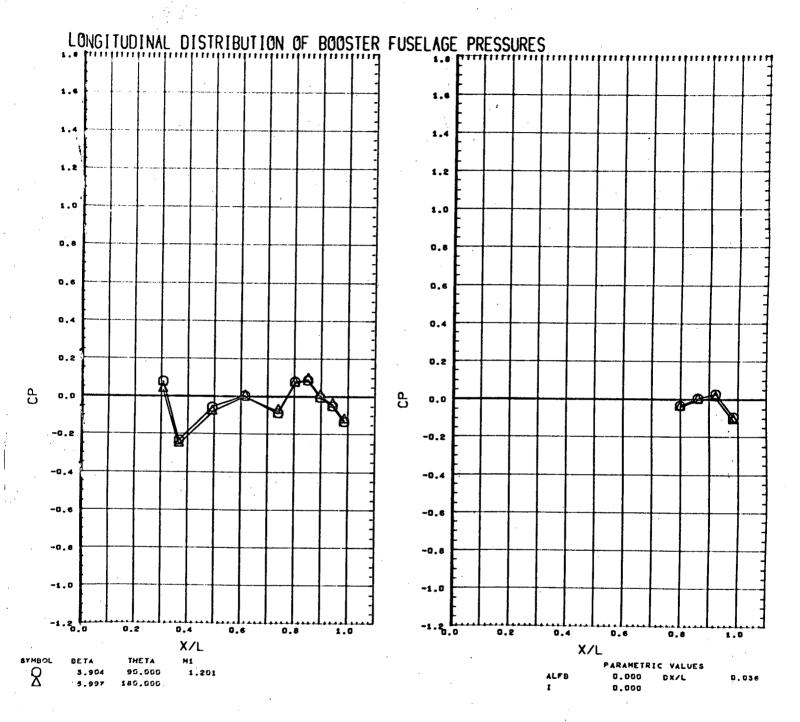
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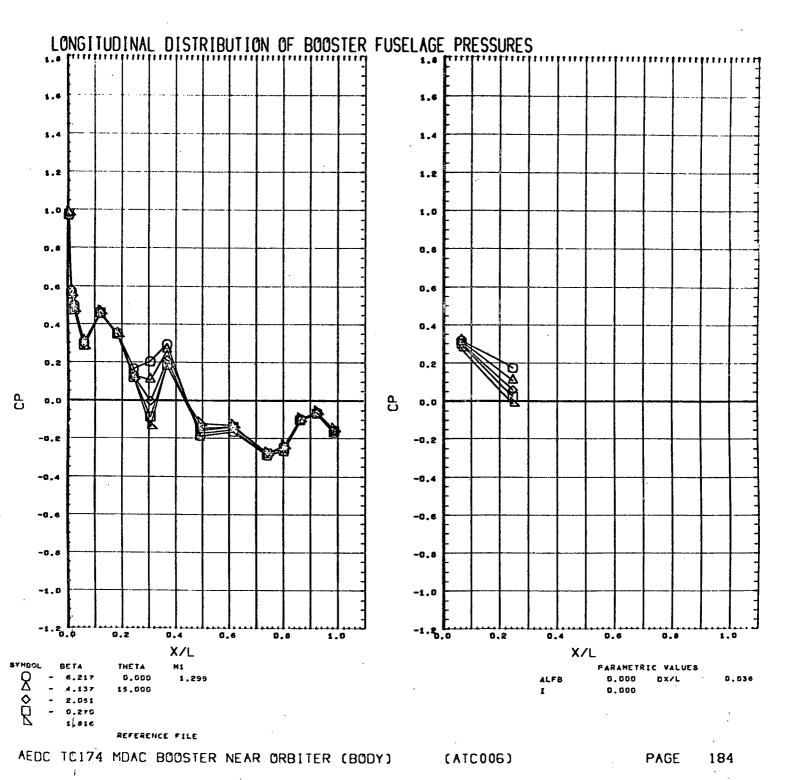
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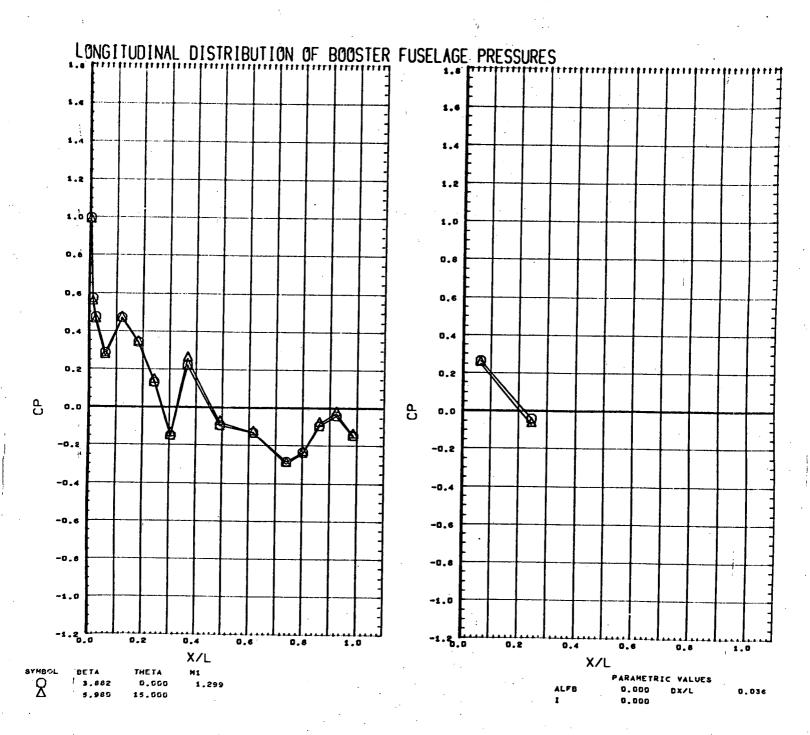


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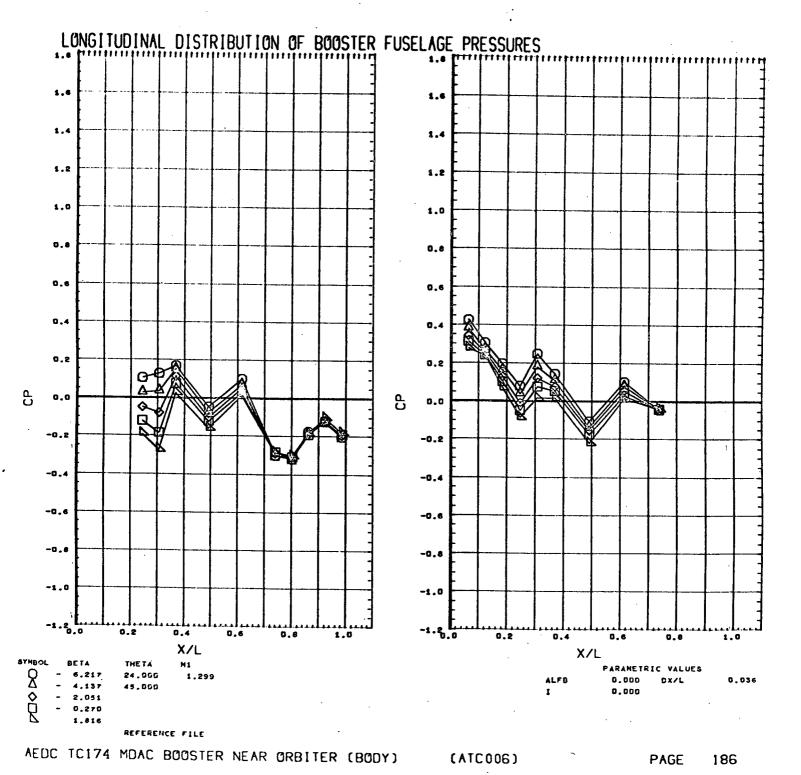
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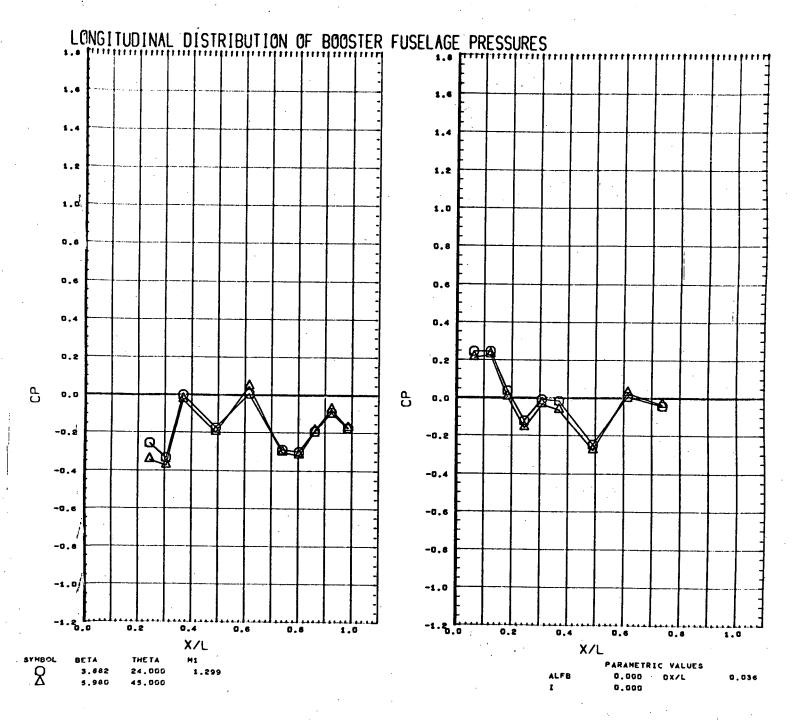




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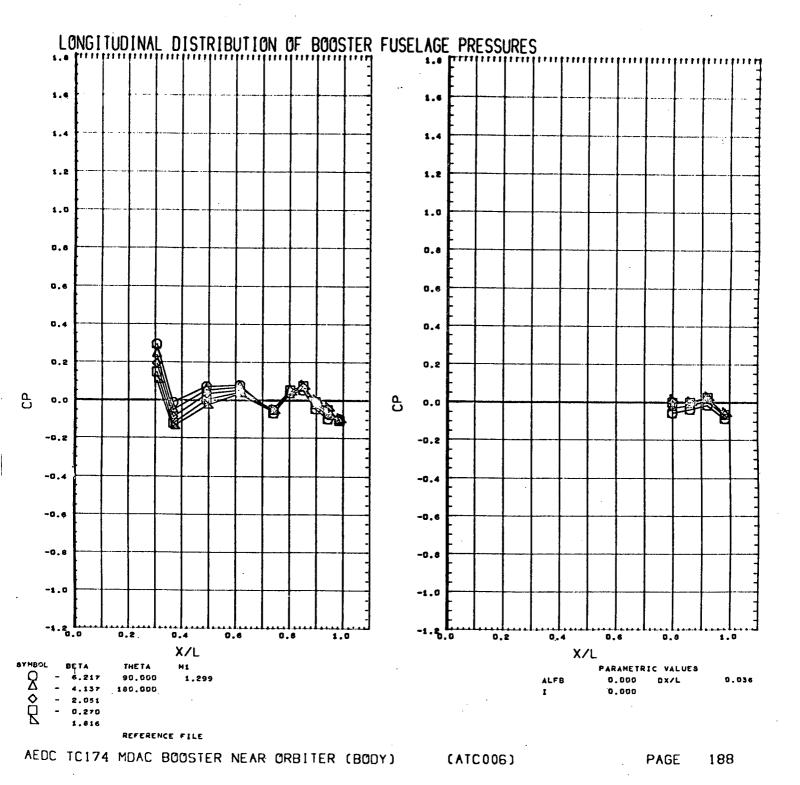
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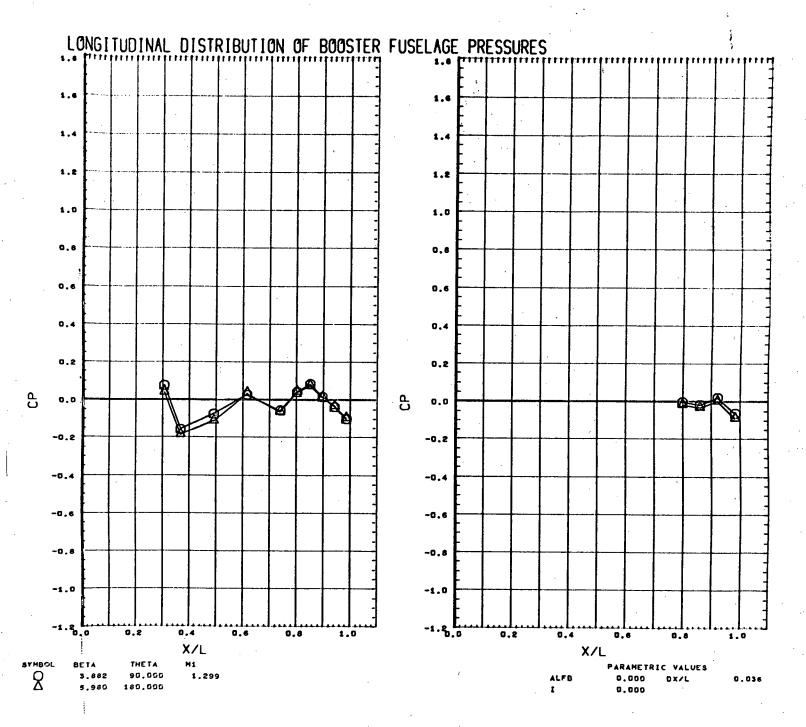




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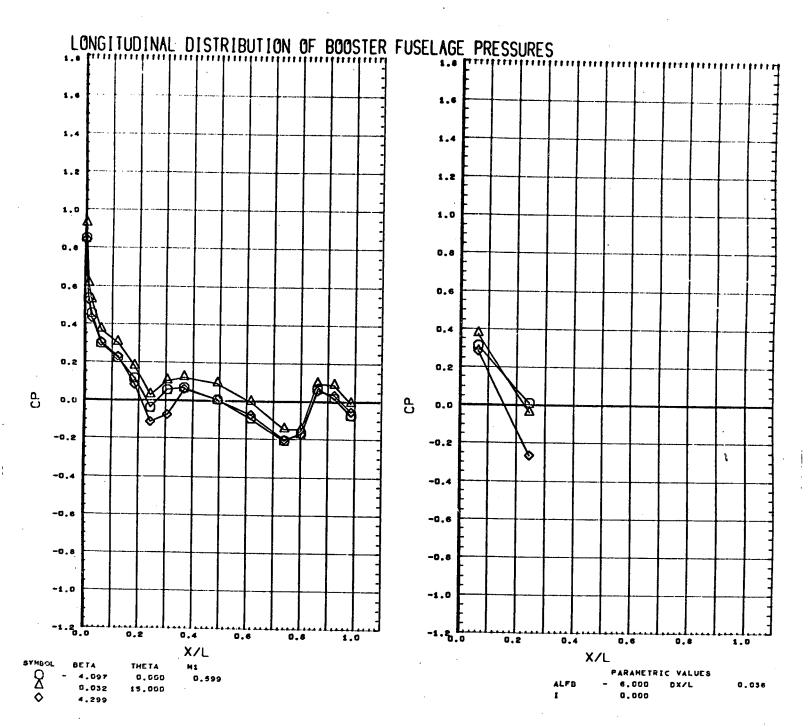




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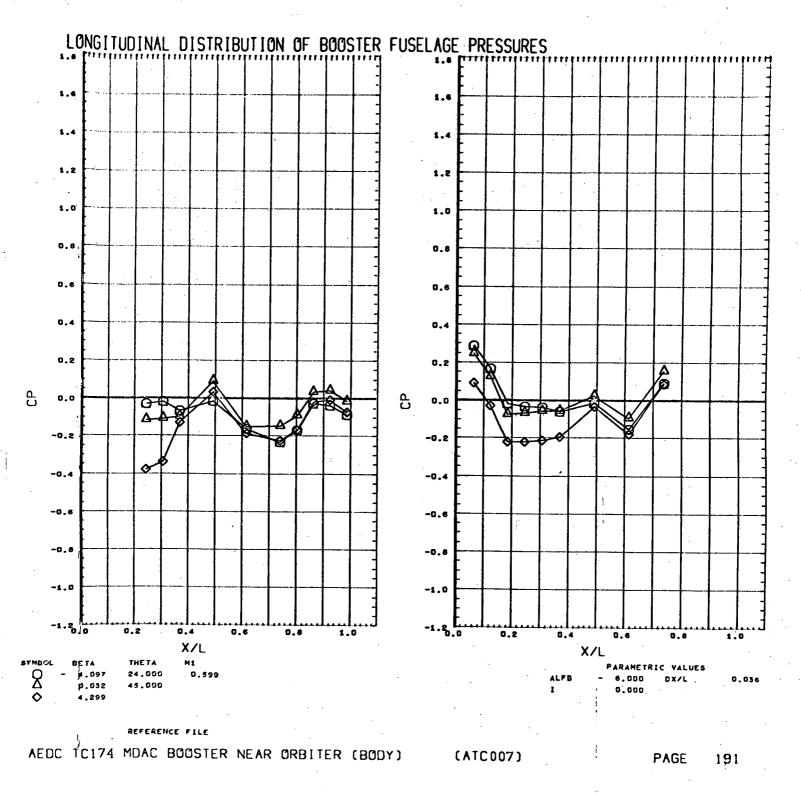
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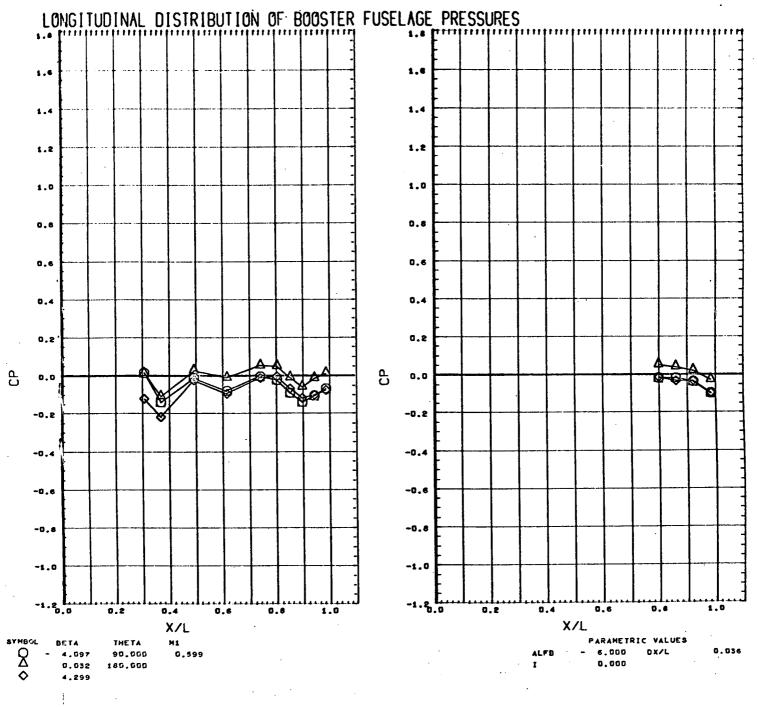
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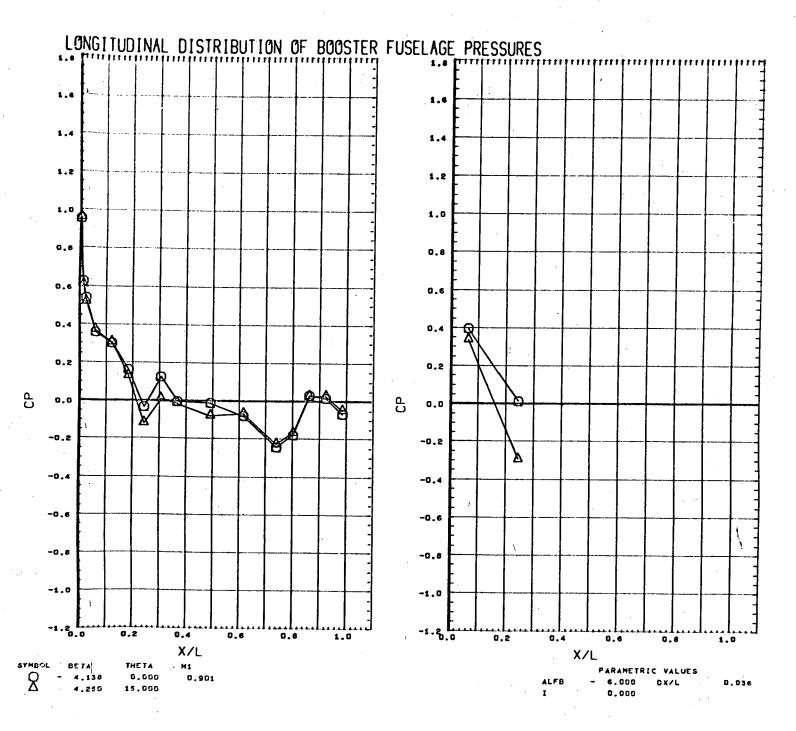




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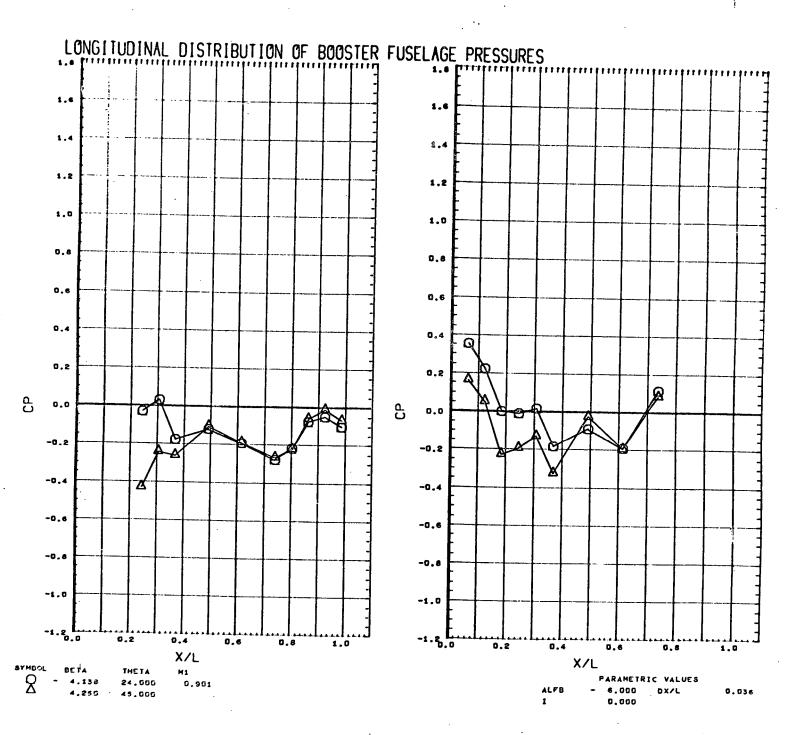
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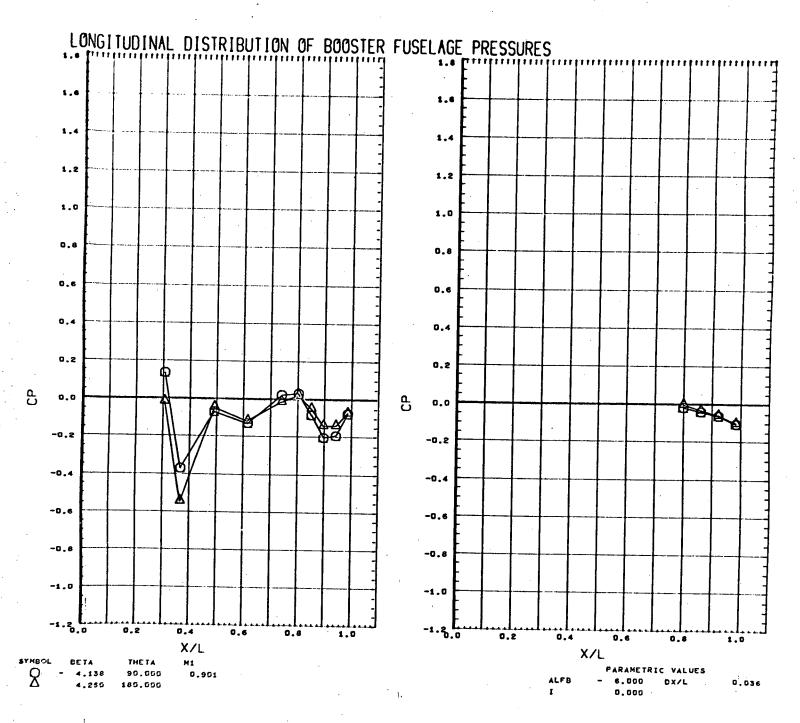
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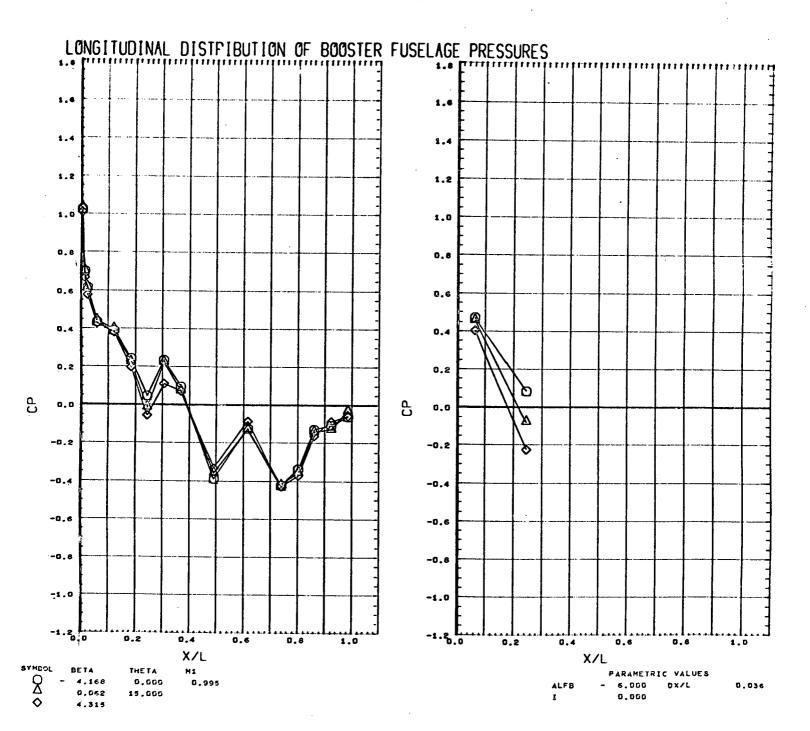


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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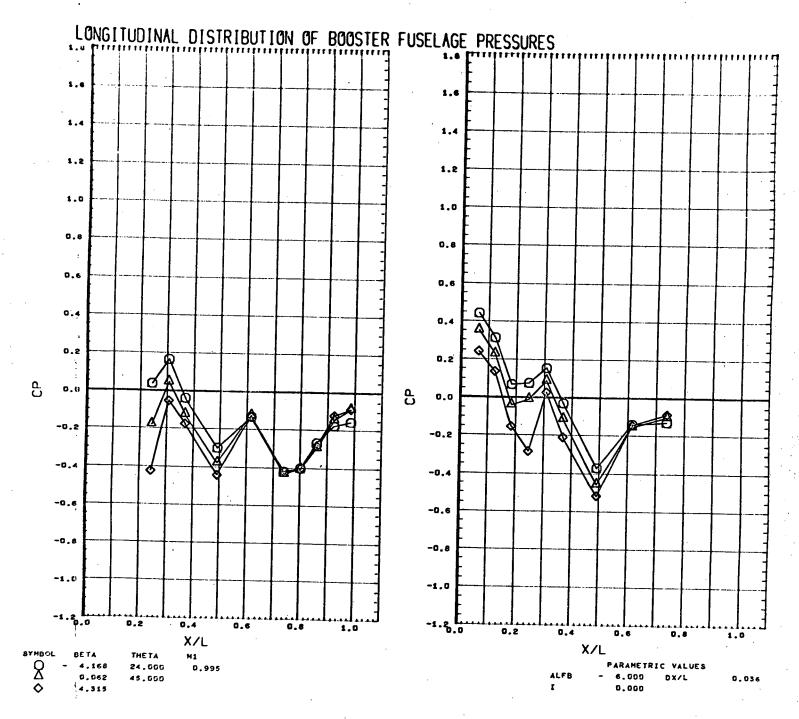
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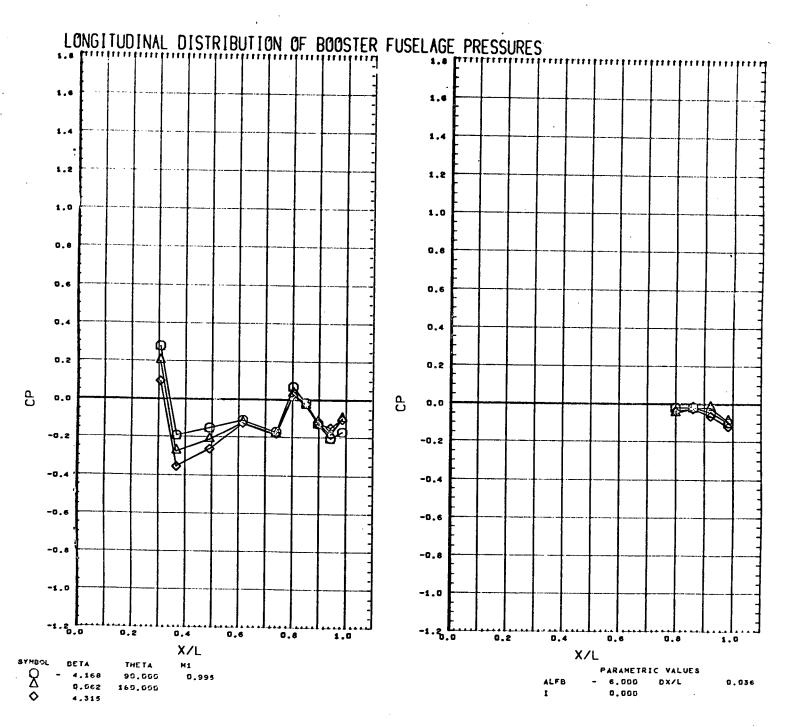
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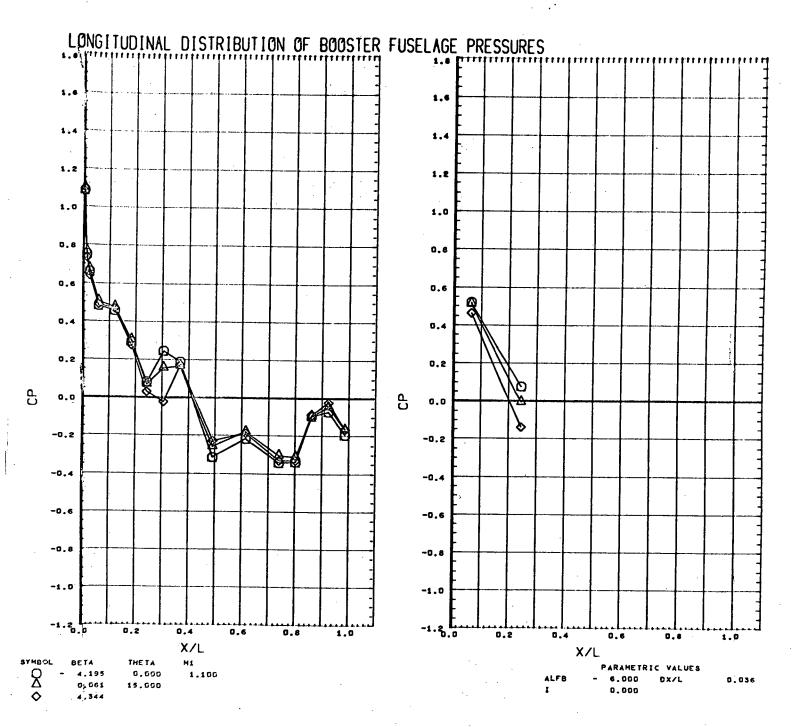
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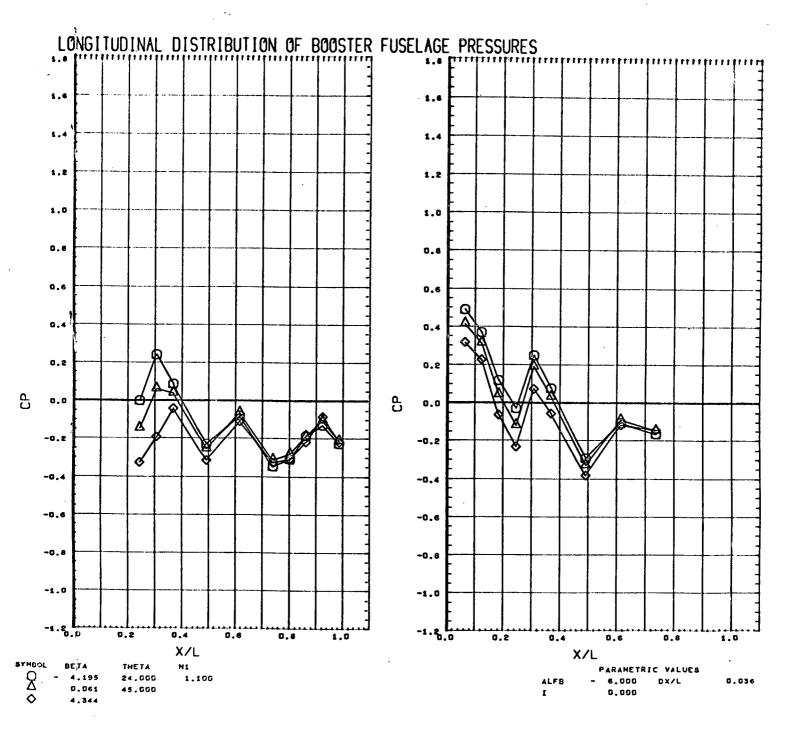
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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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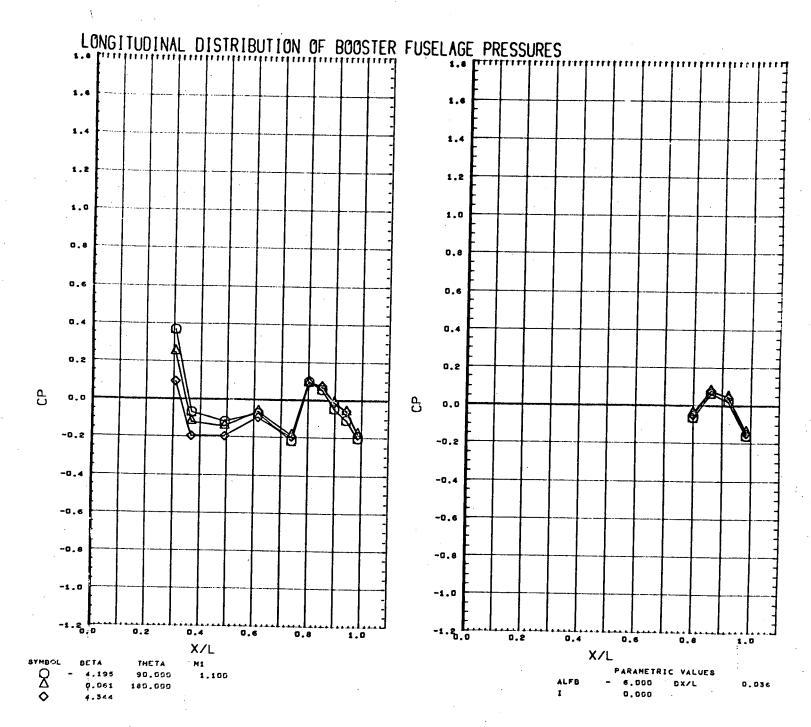


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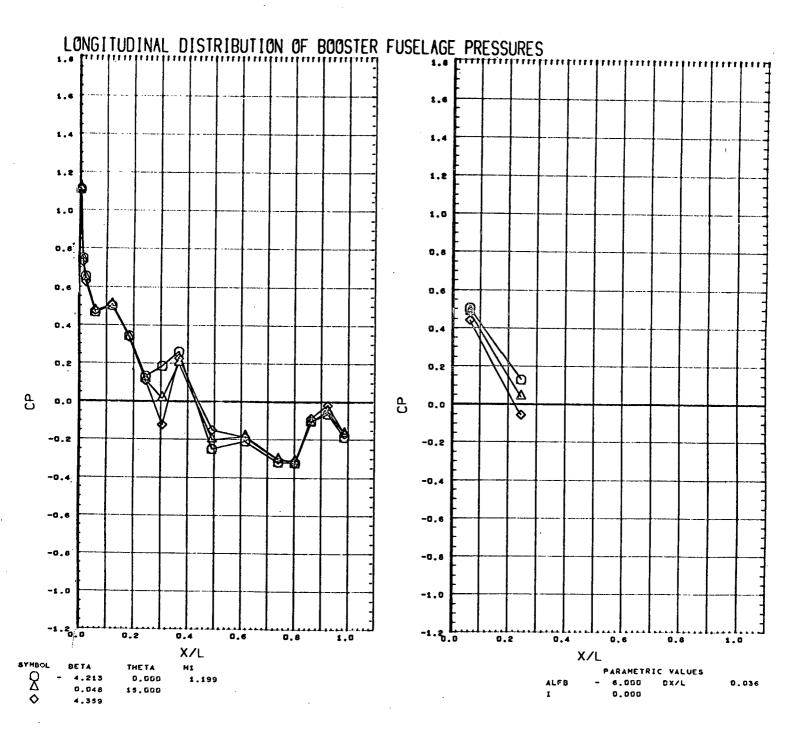
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special results Support



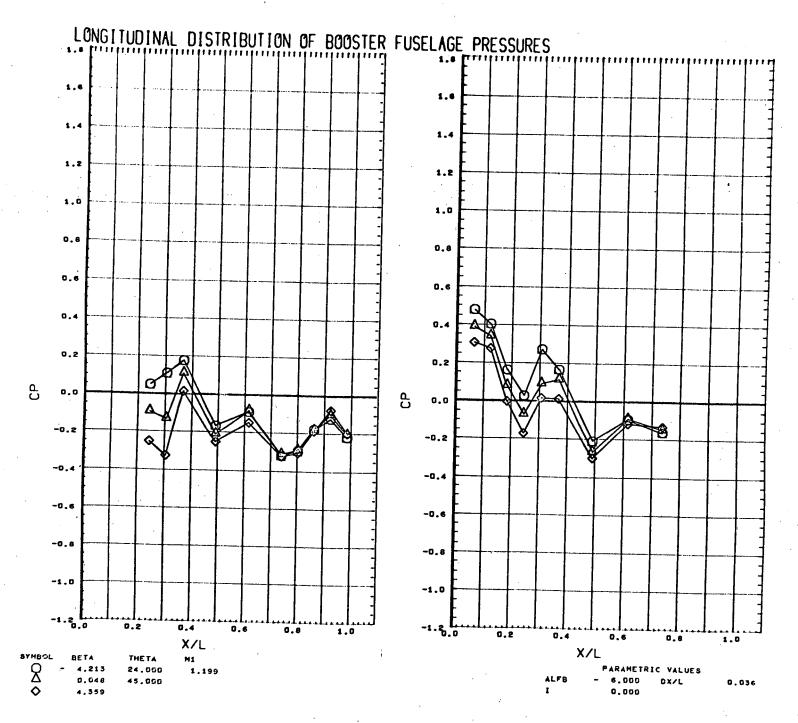
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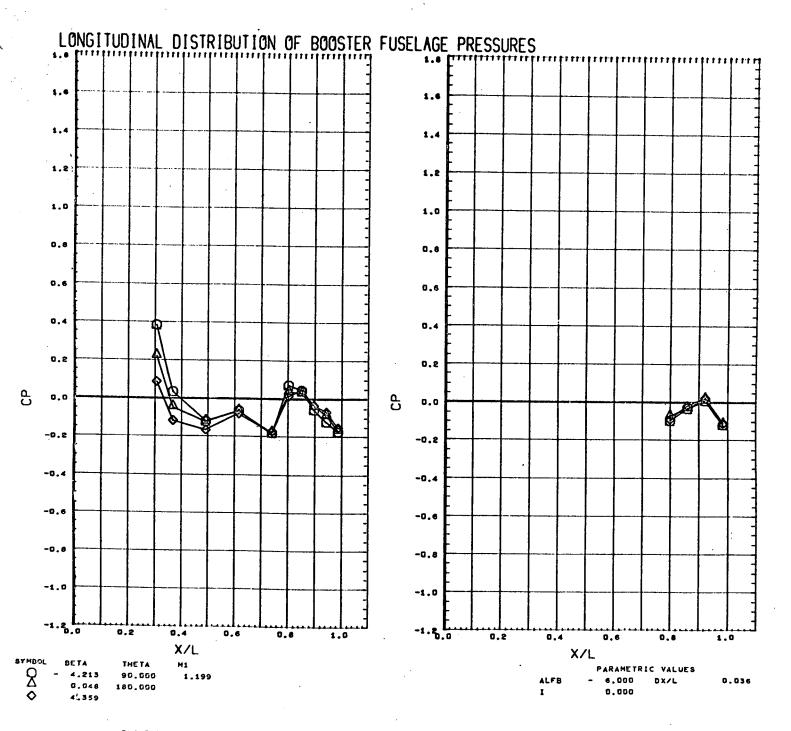
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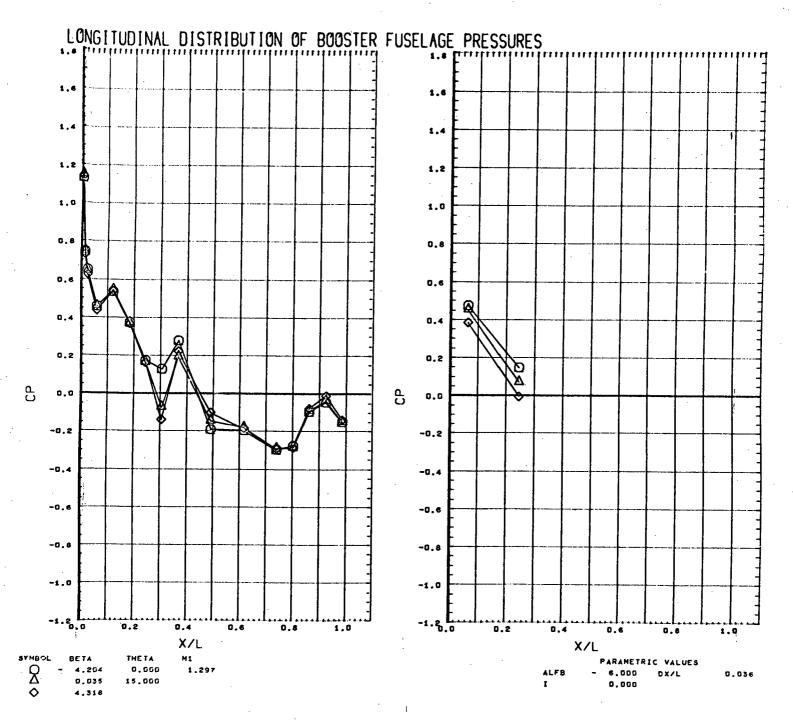
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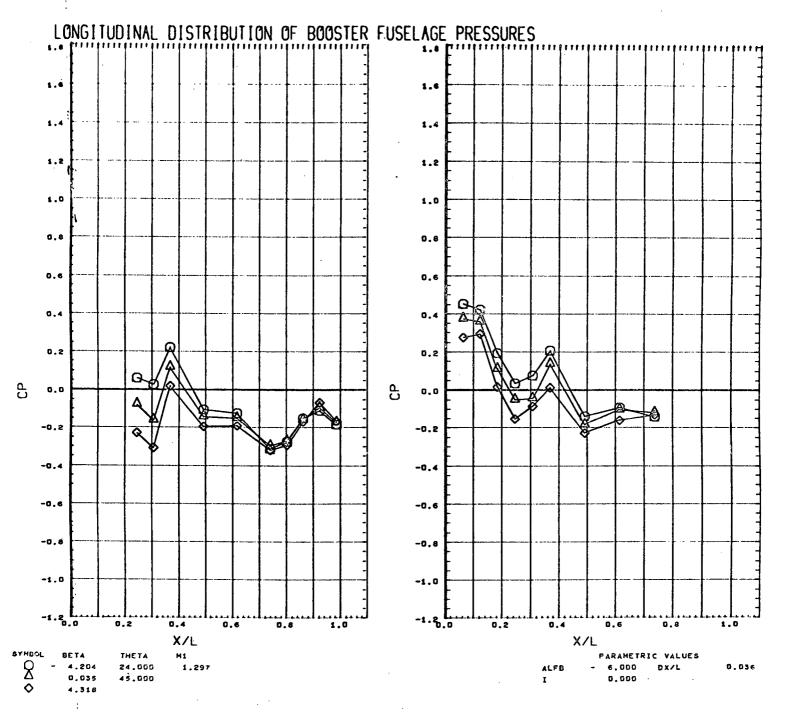
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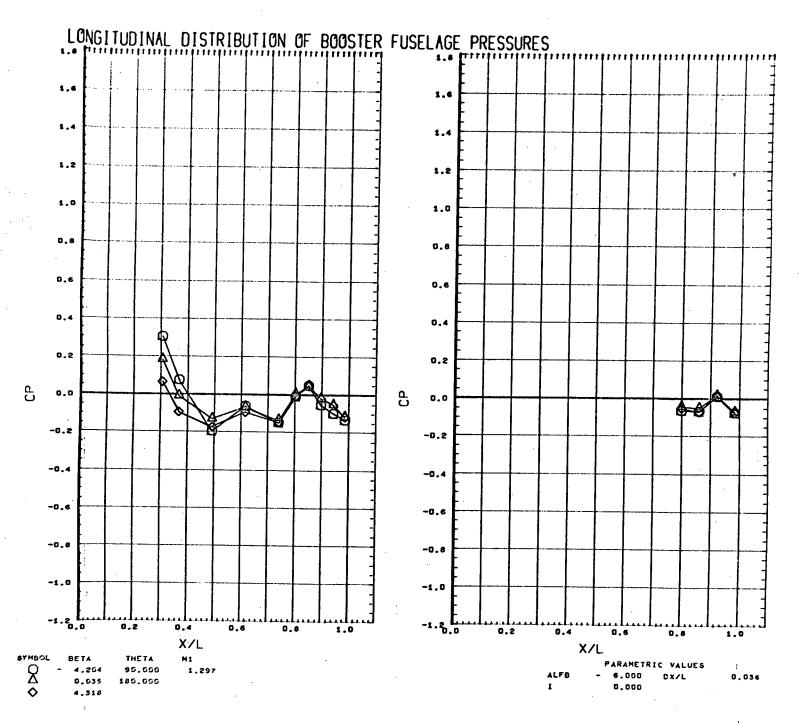
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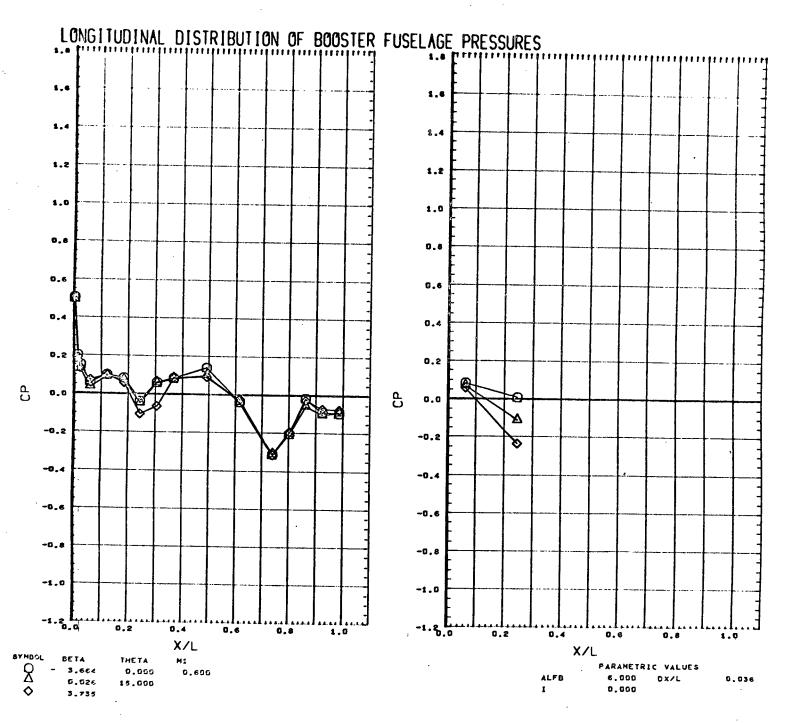
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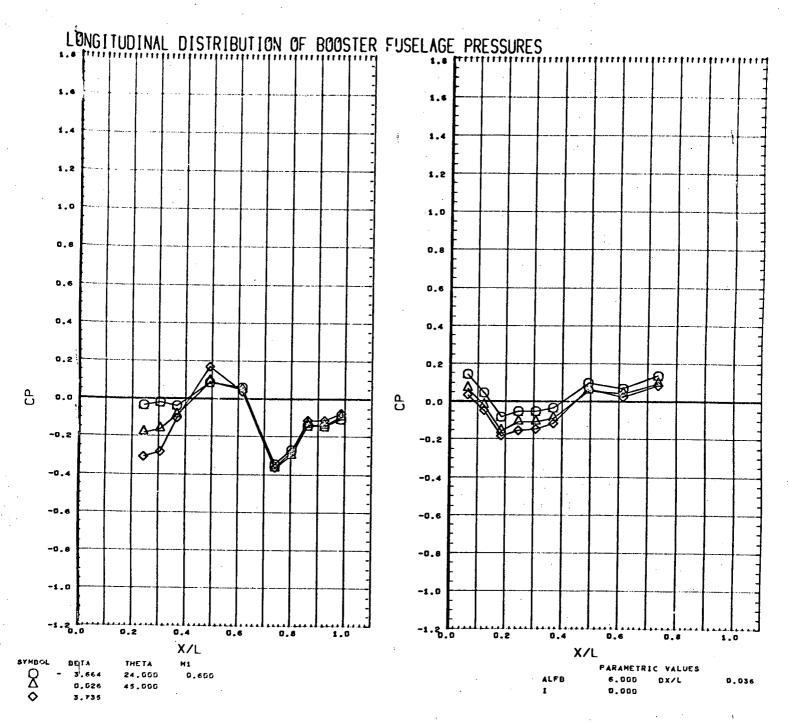
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(ATC007)



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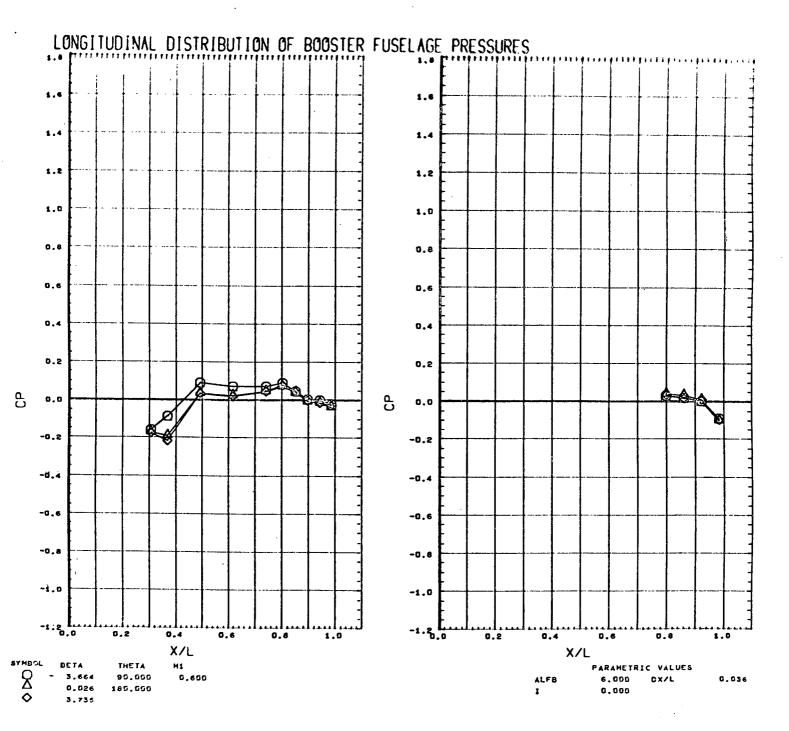
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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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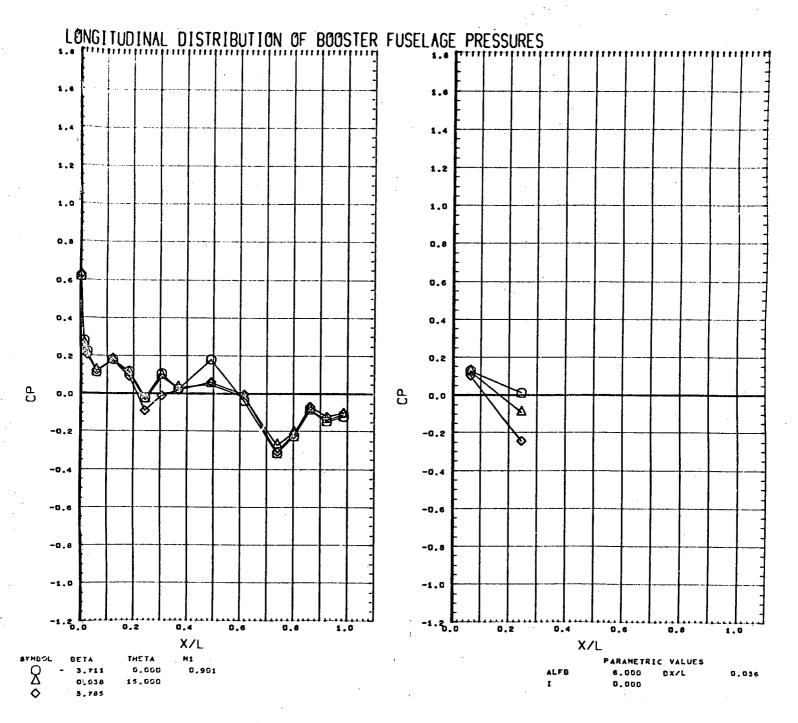
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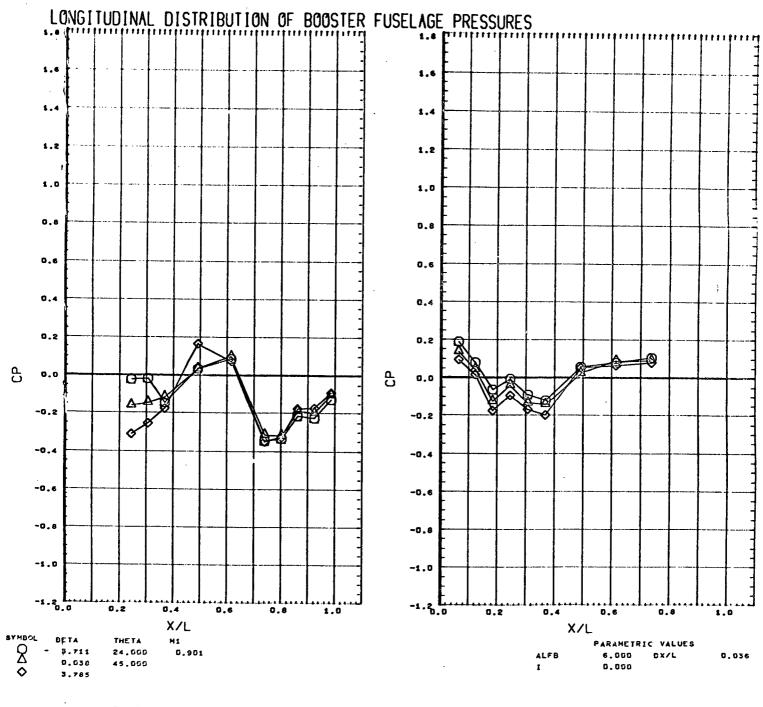
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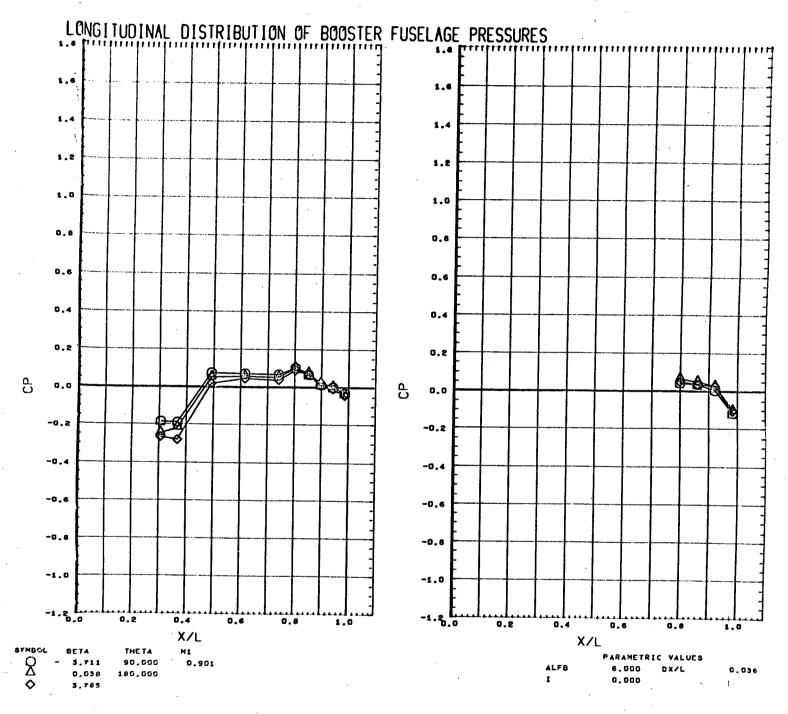
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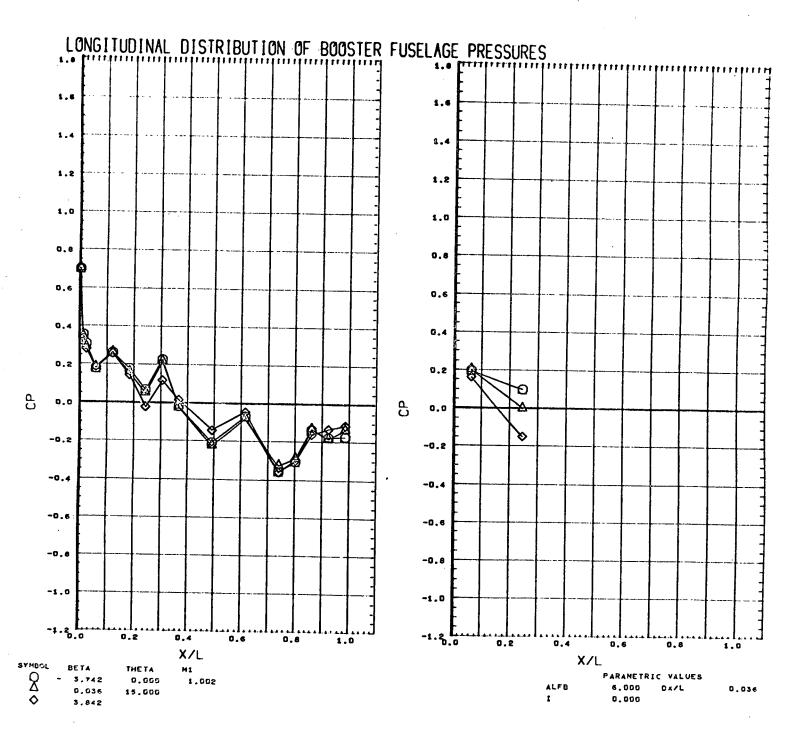
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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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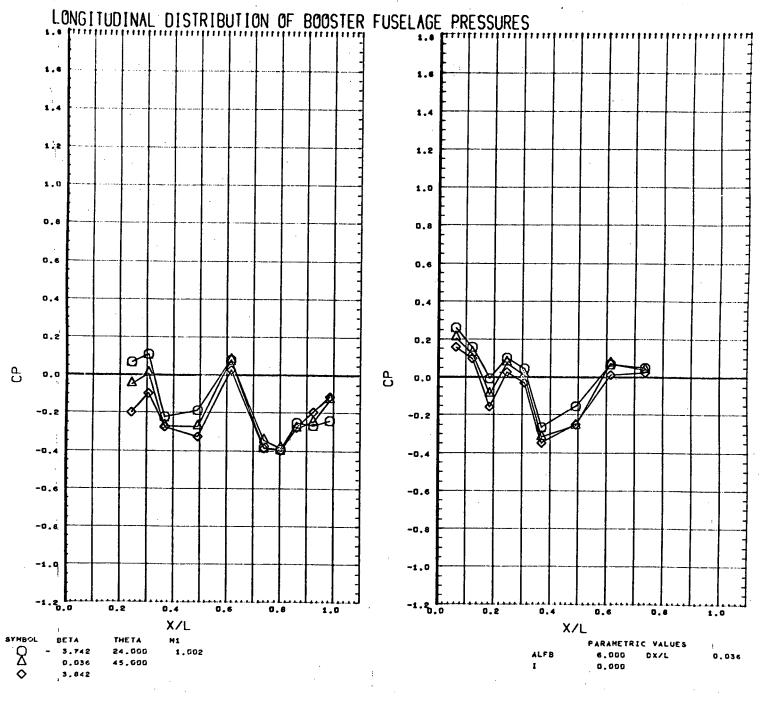
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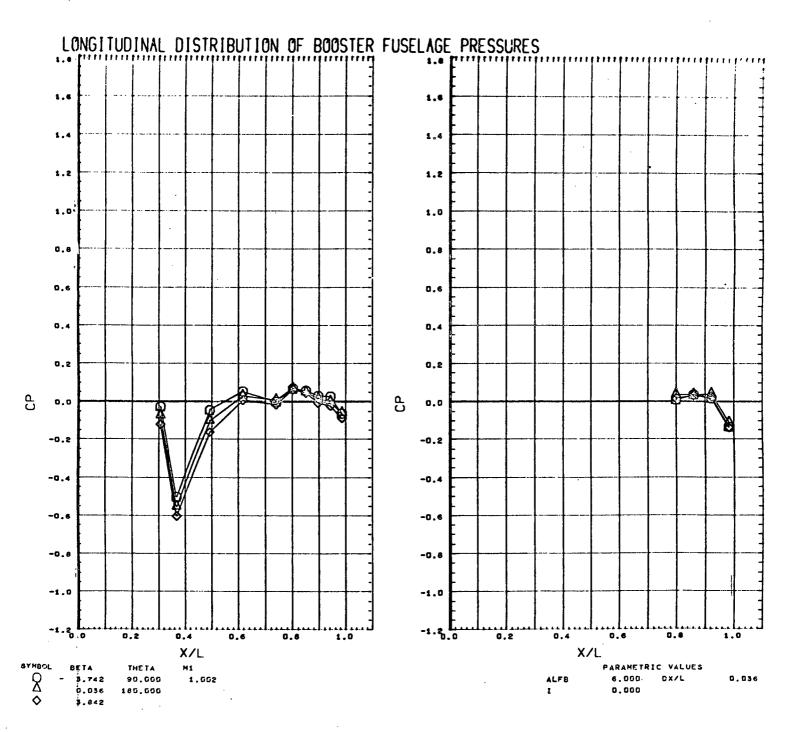
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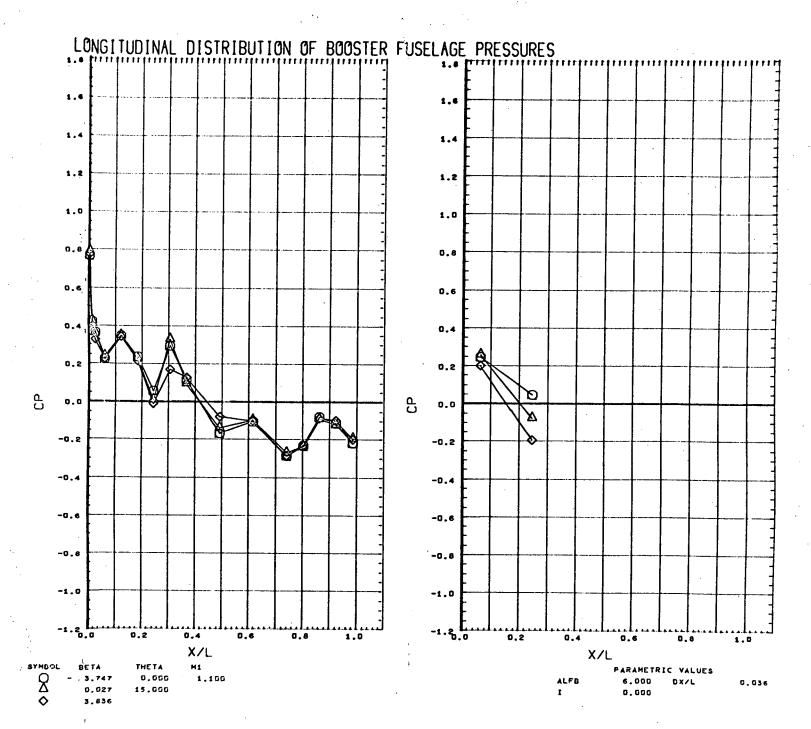
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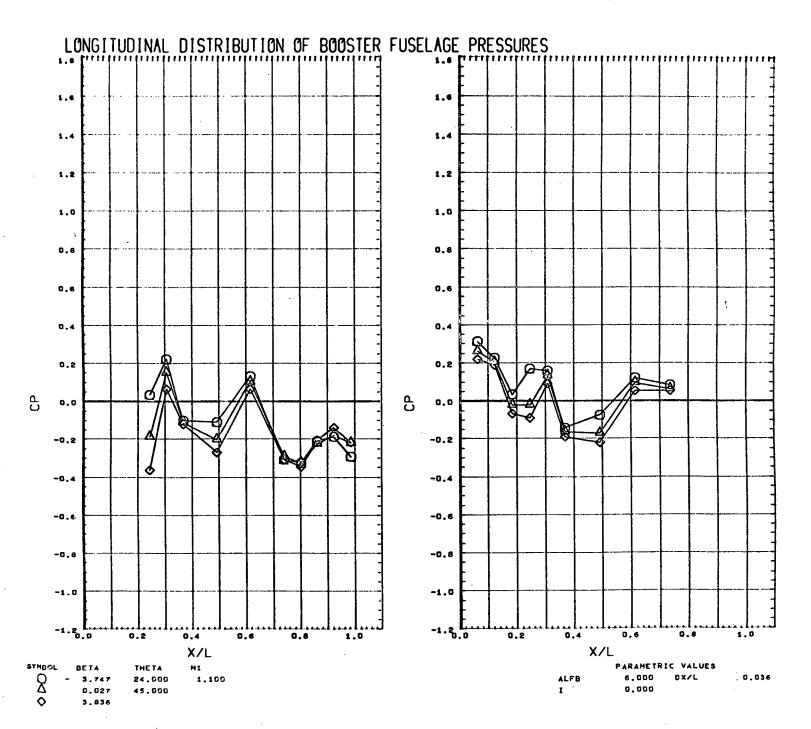
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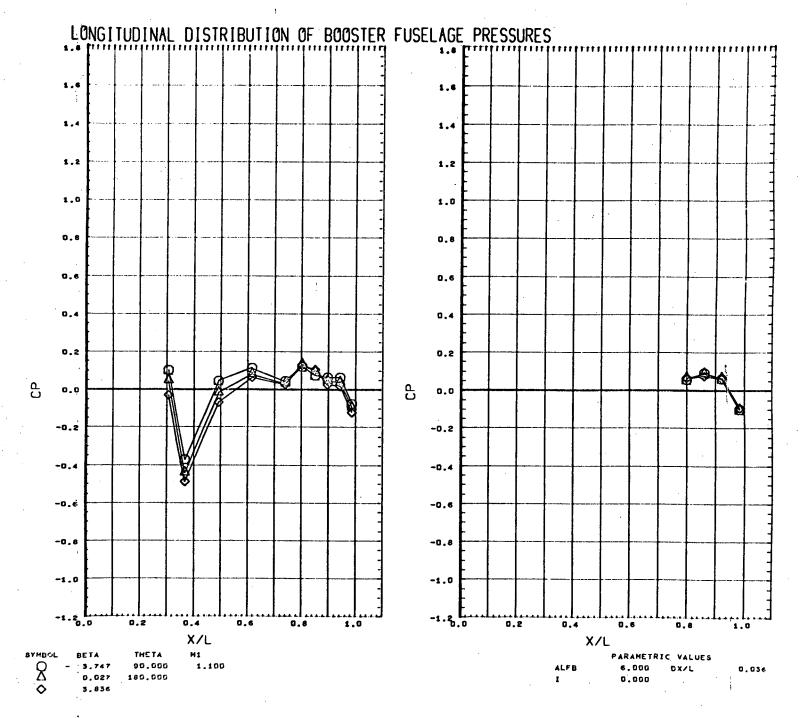


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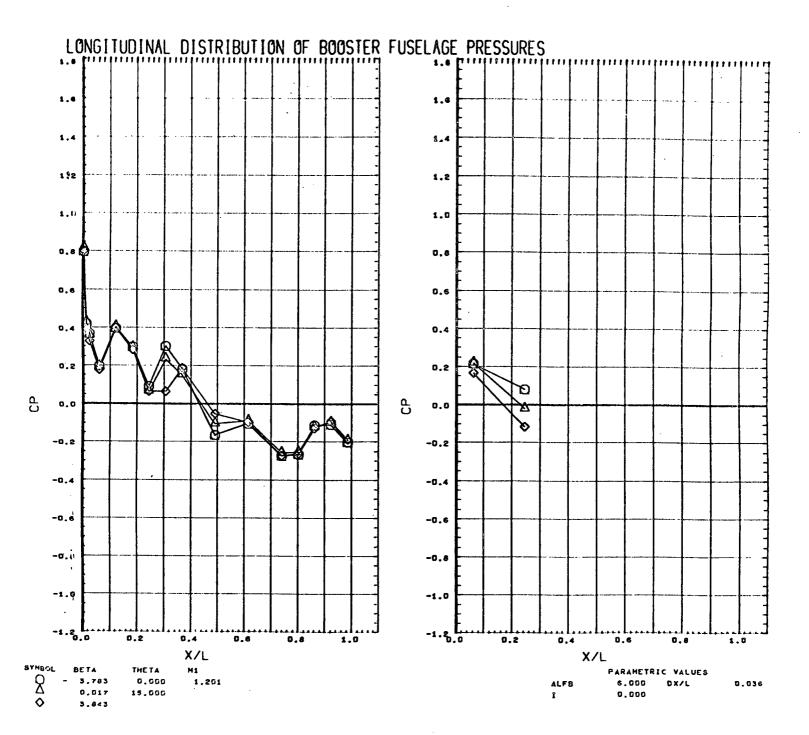
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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY) (ATC008)



AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY) (ATC008)



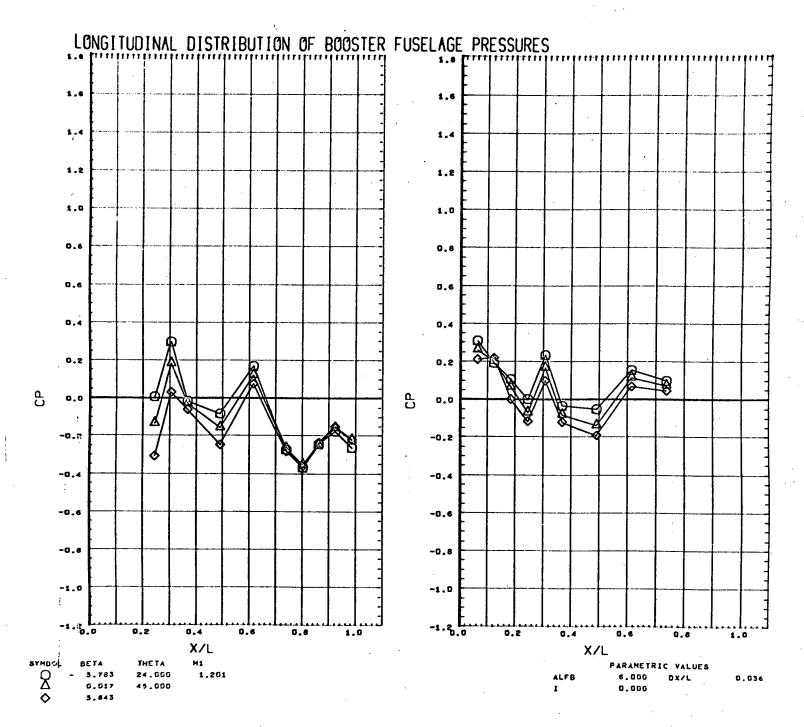
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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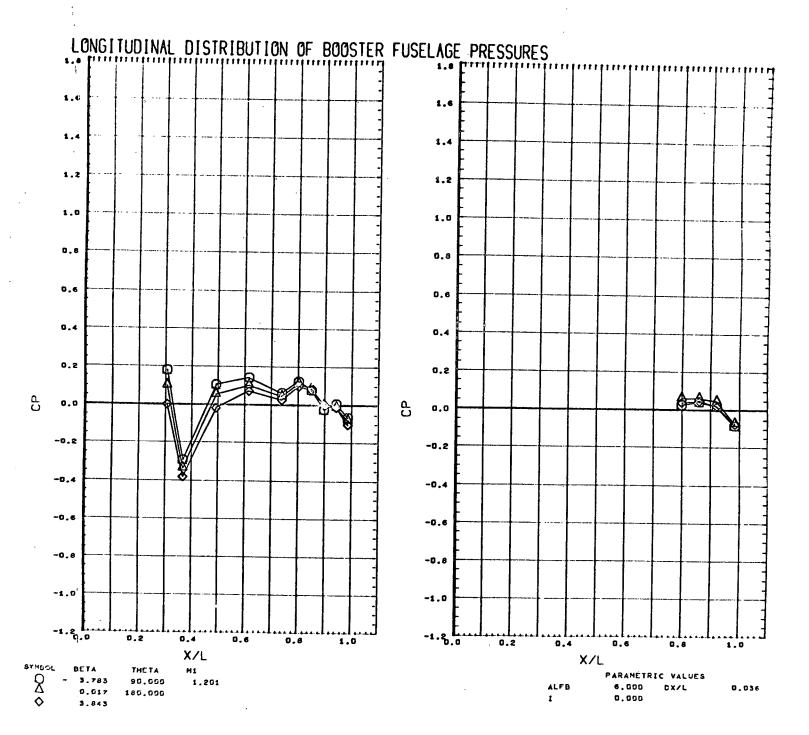
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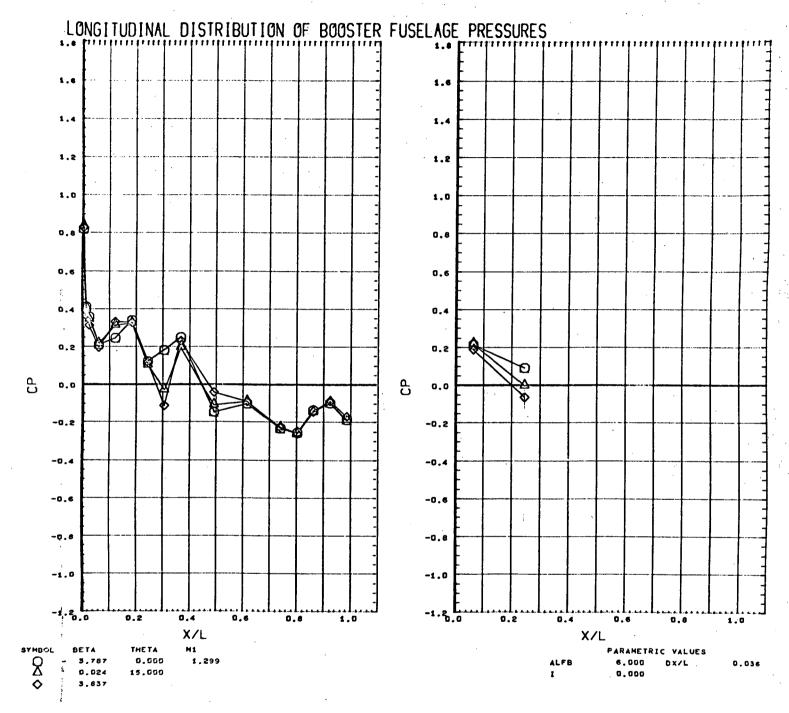
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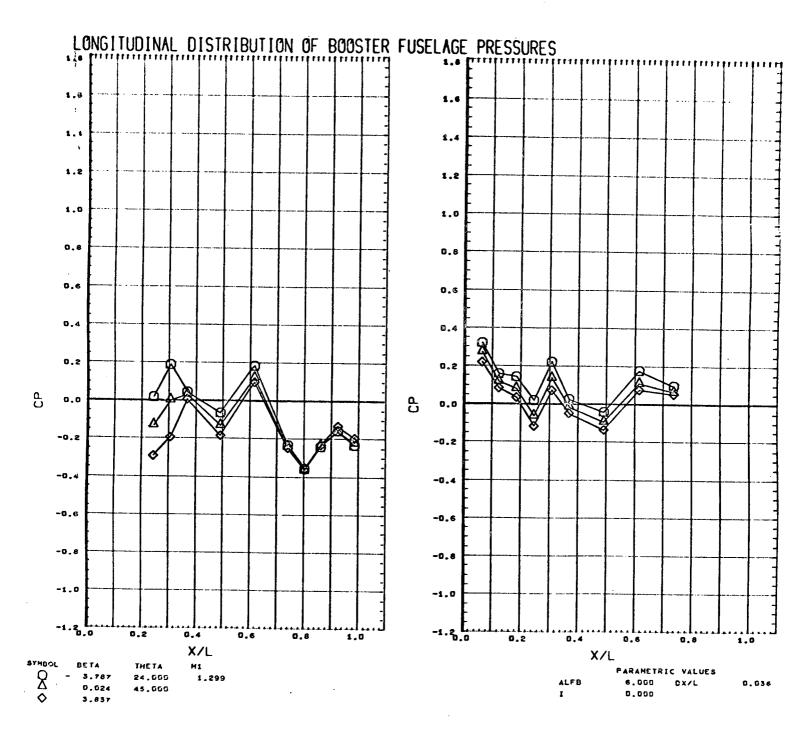
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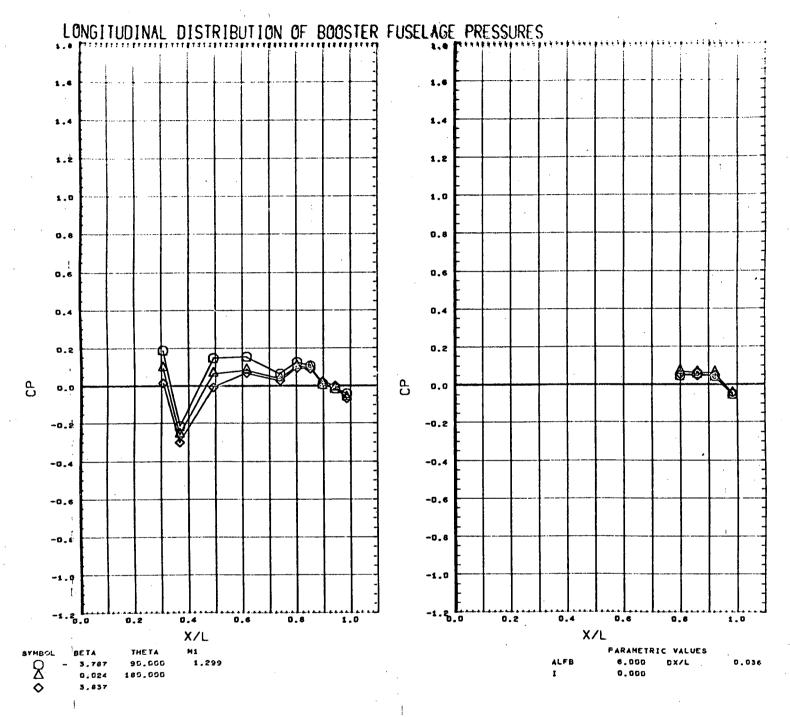
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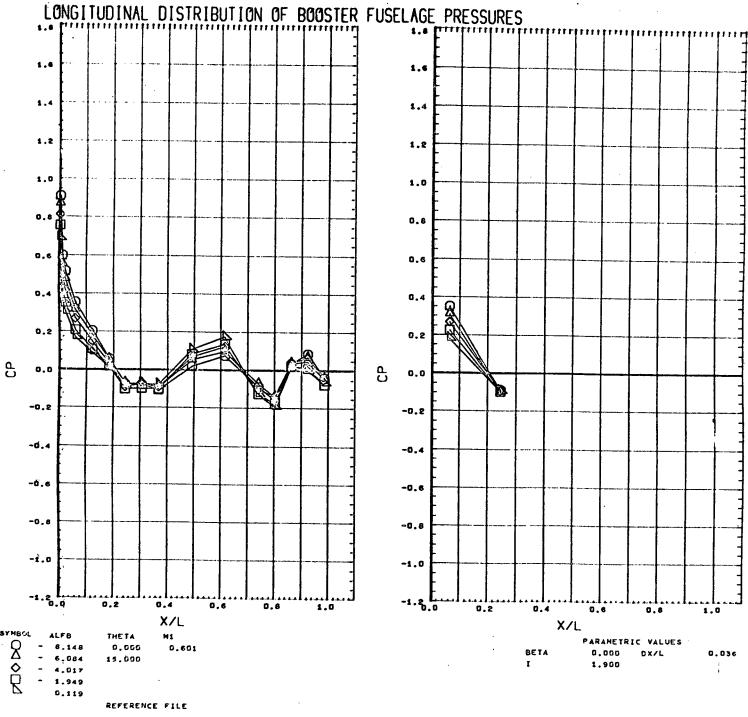
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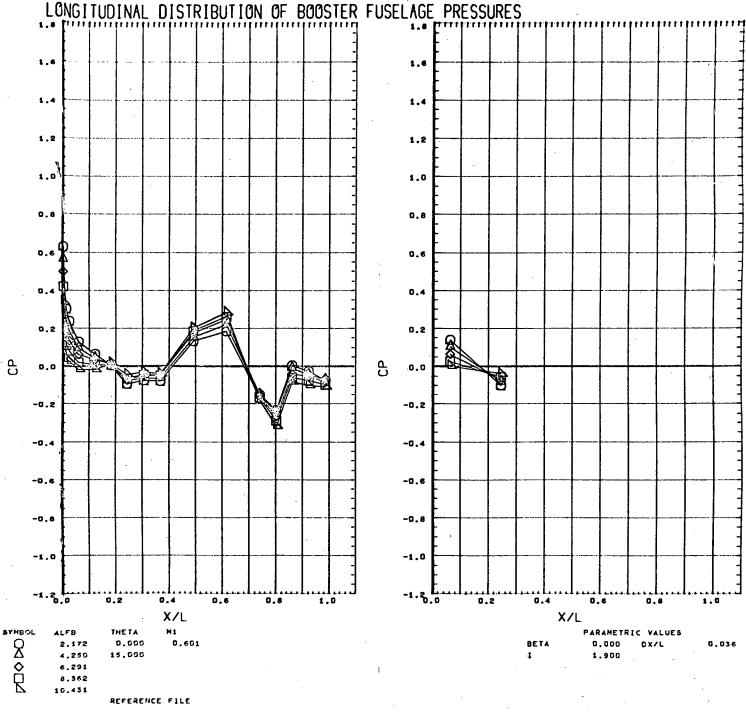


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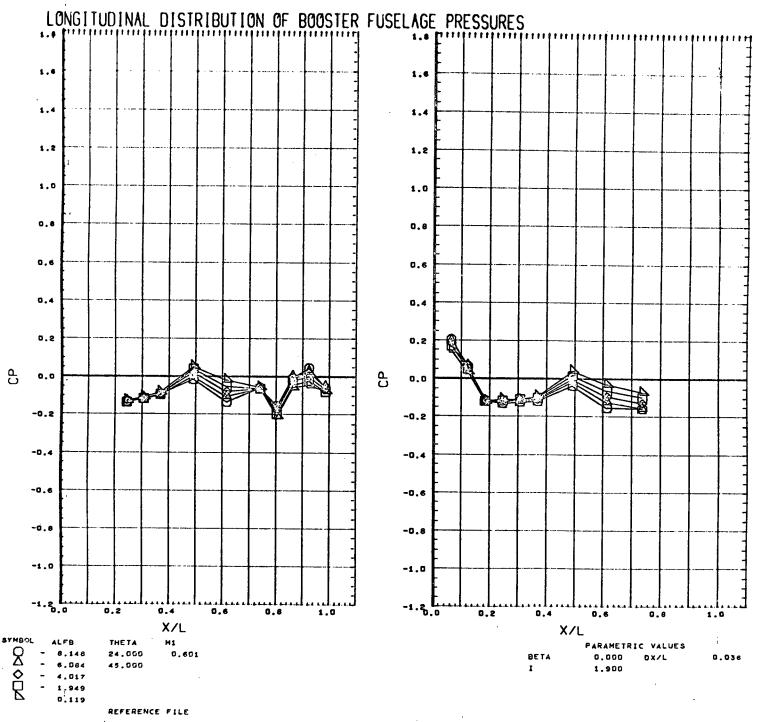
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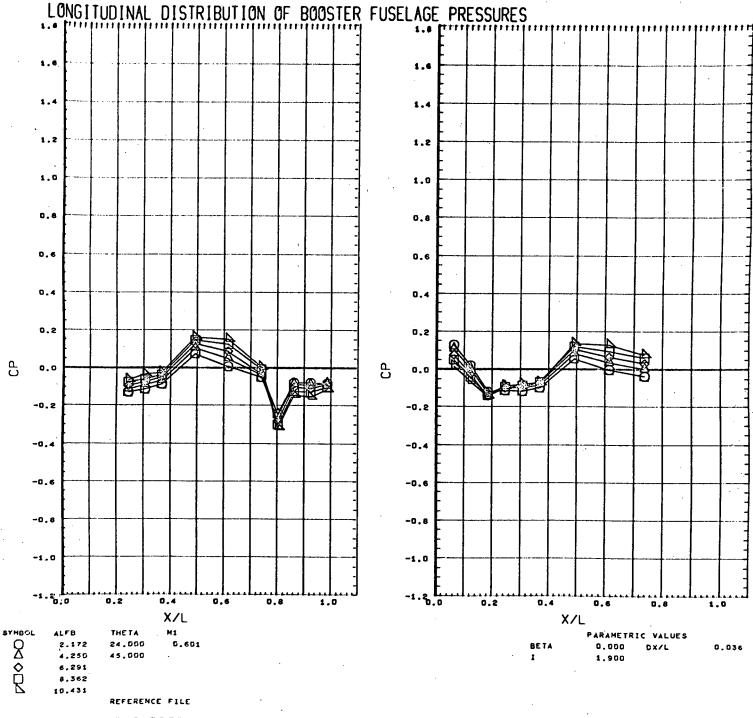
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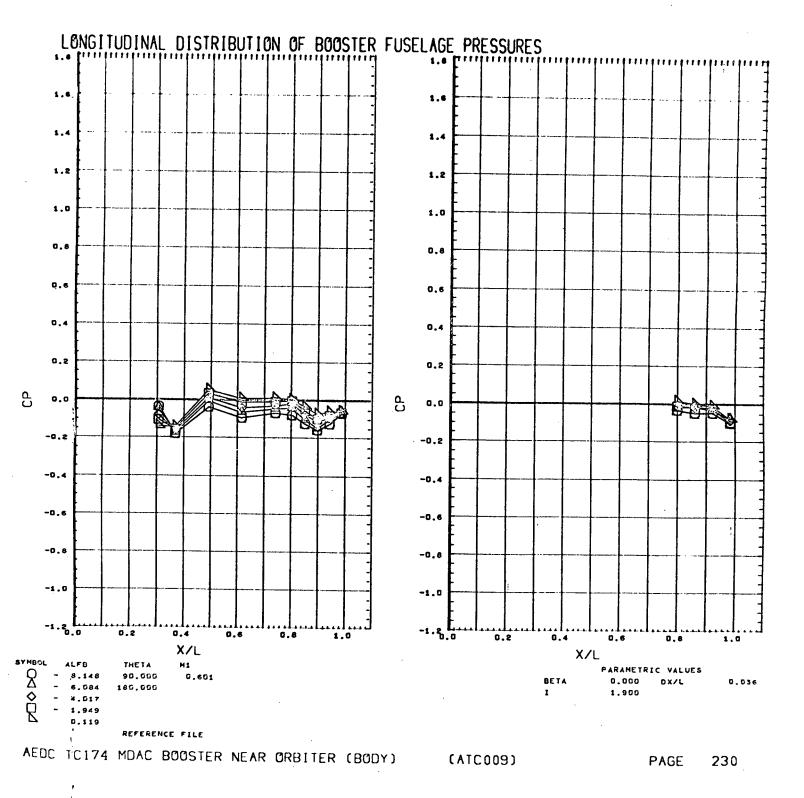
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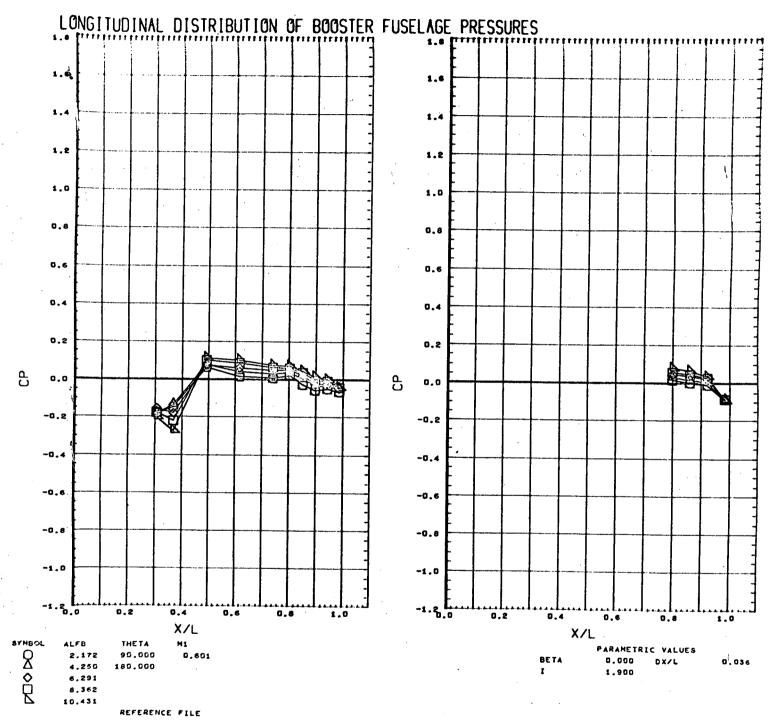


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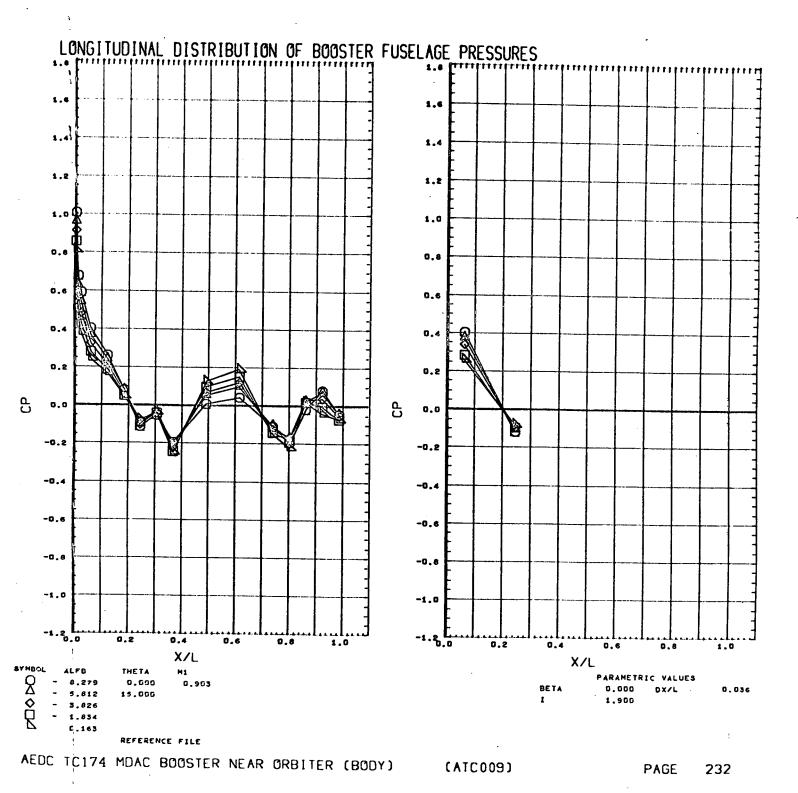


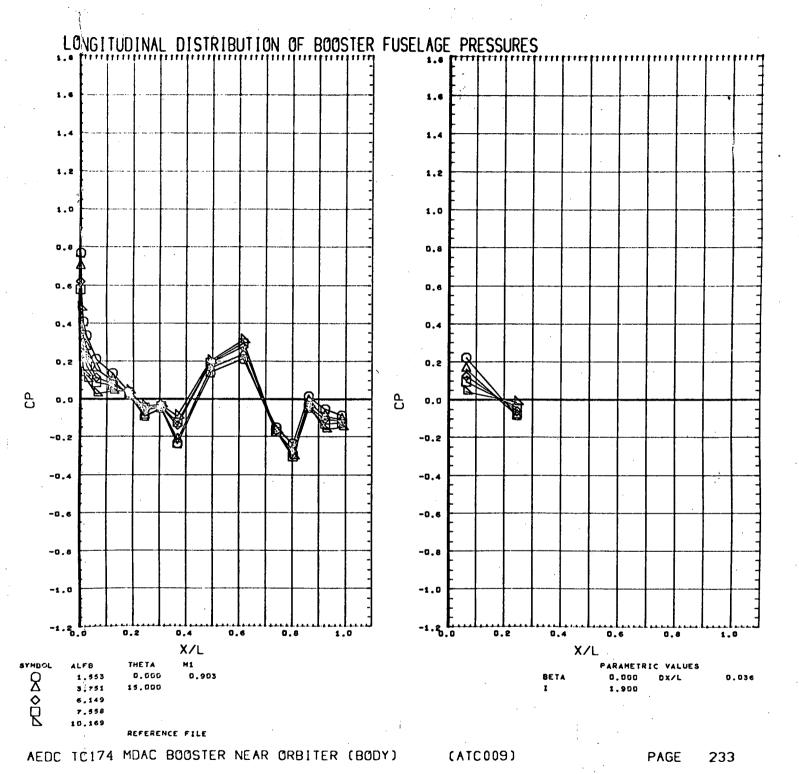


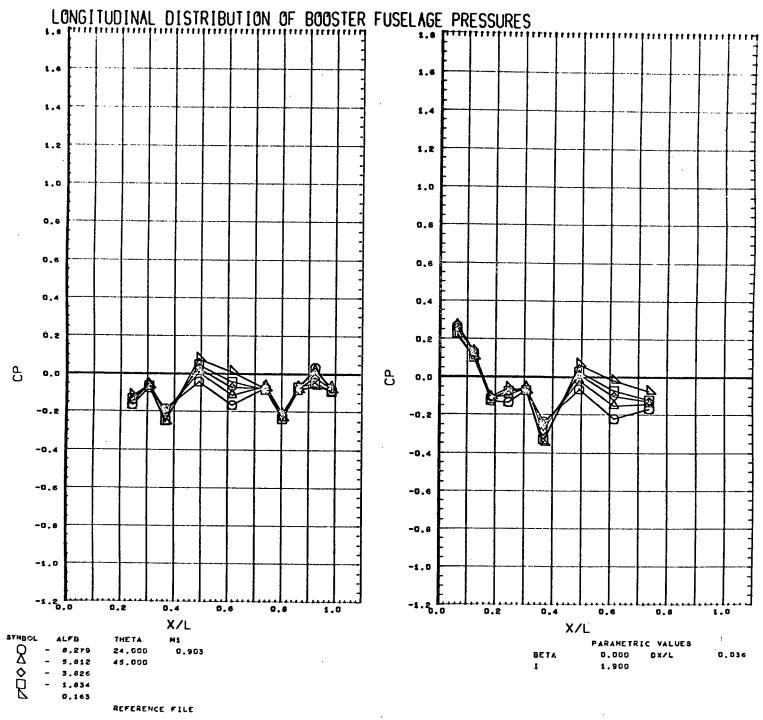
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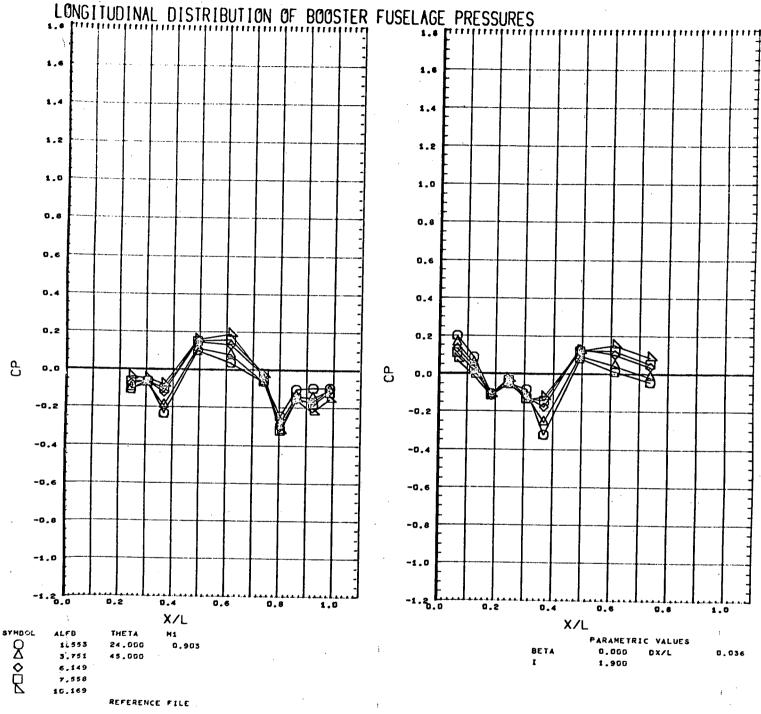




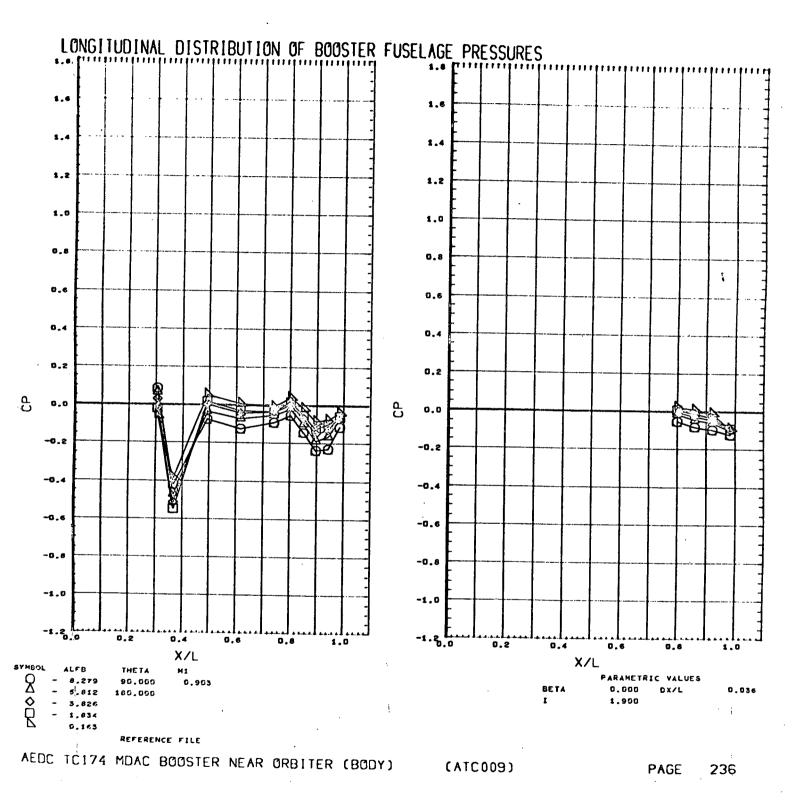


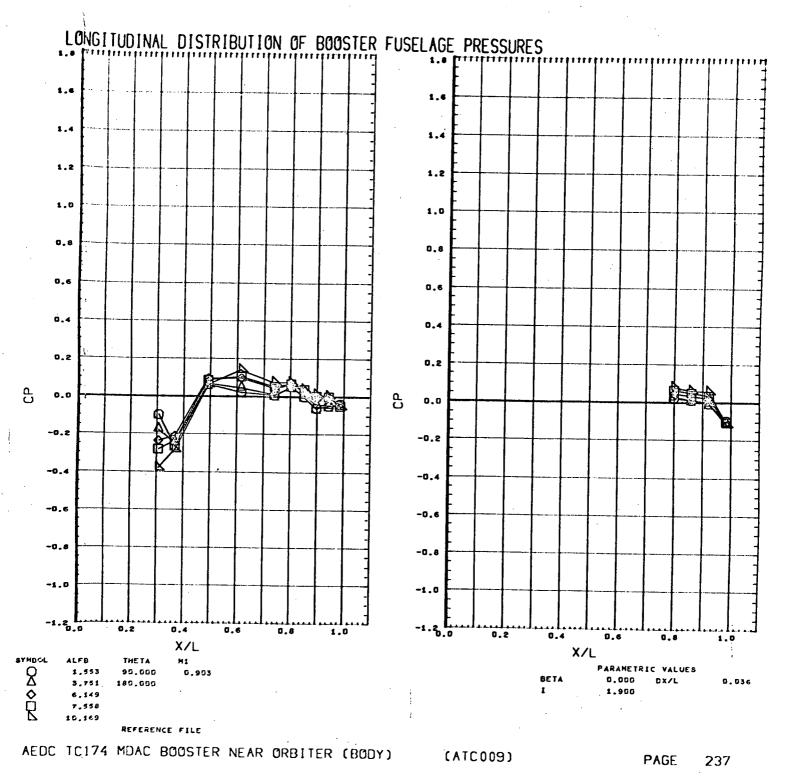
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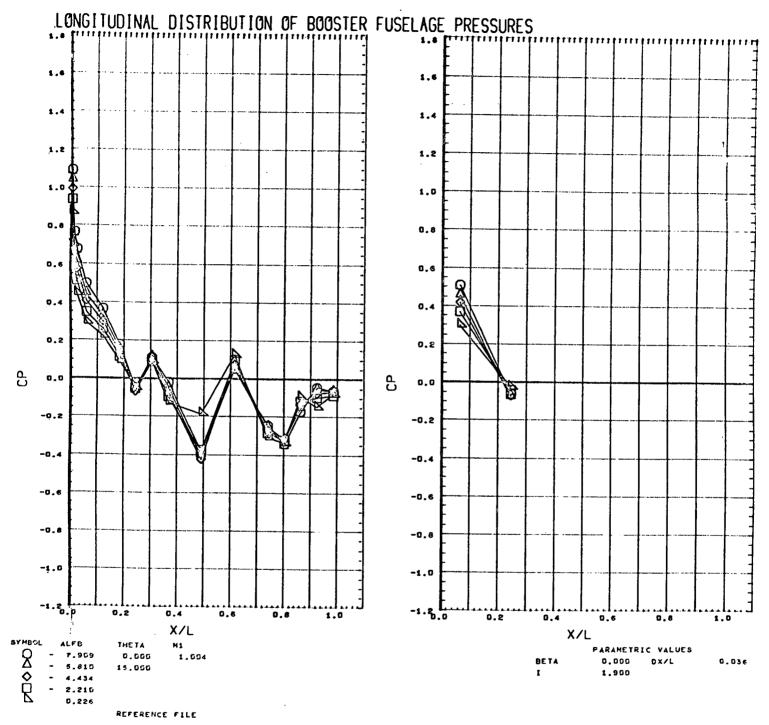
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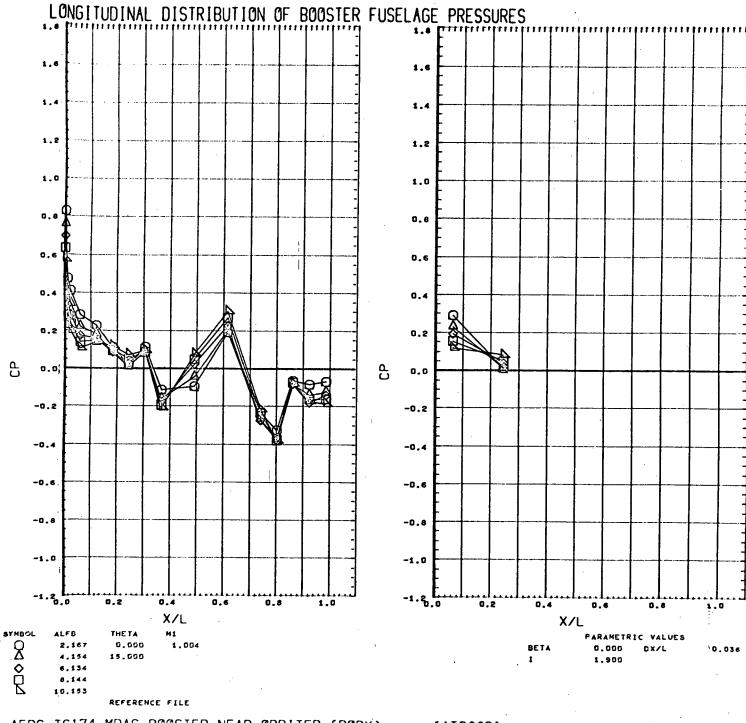
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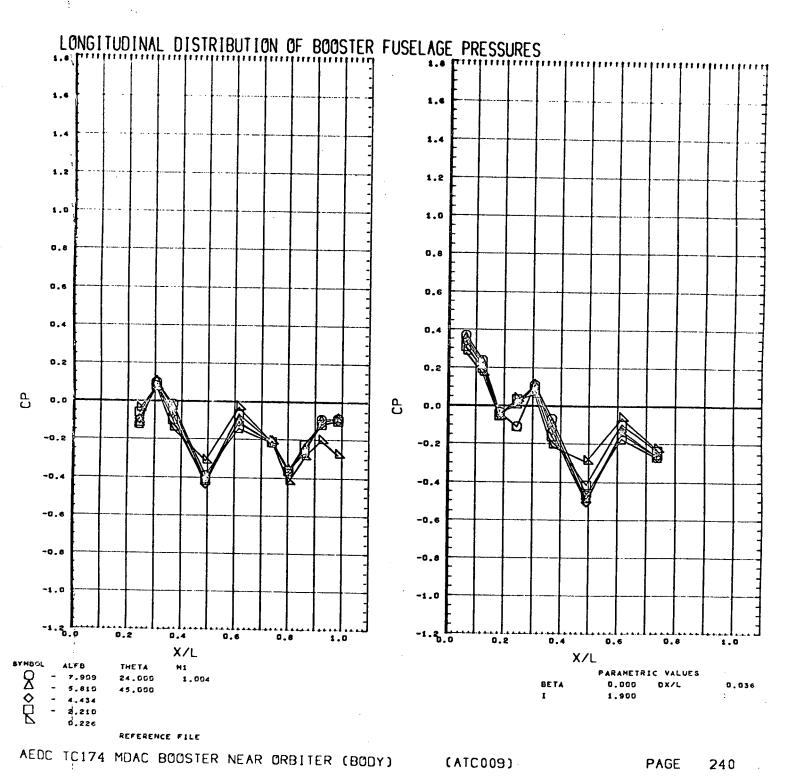
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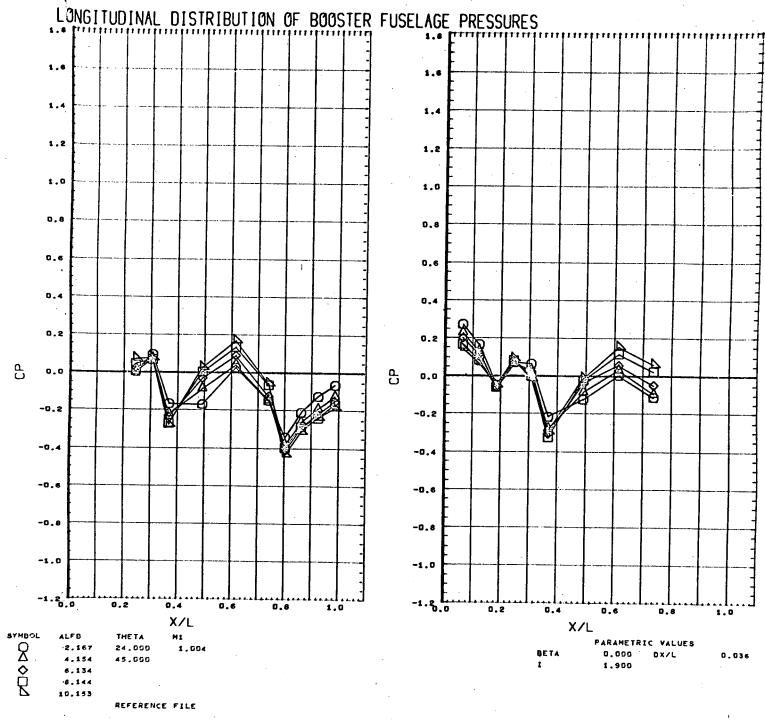


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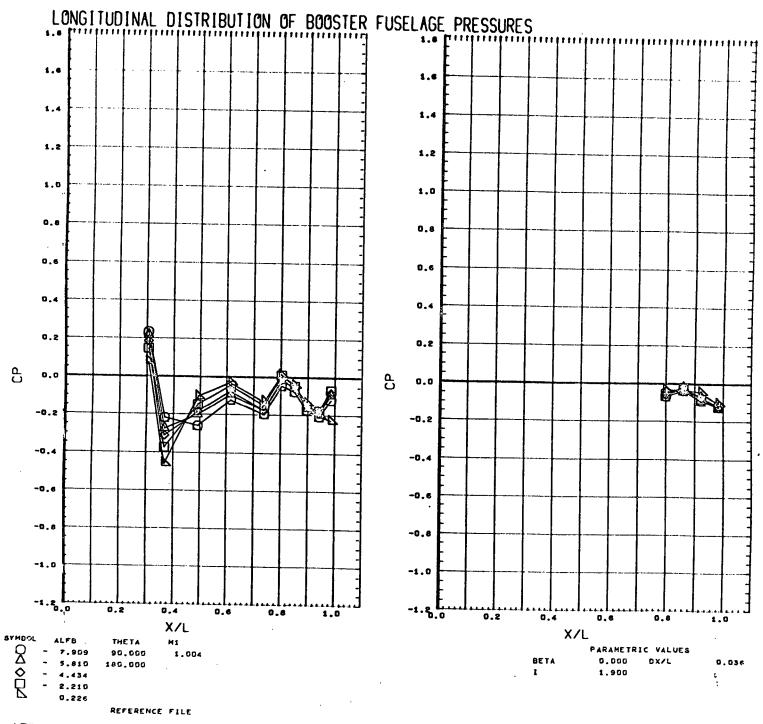
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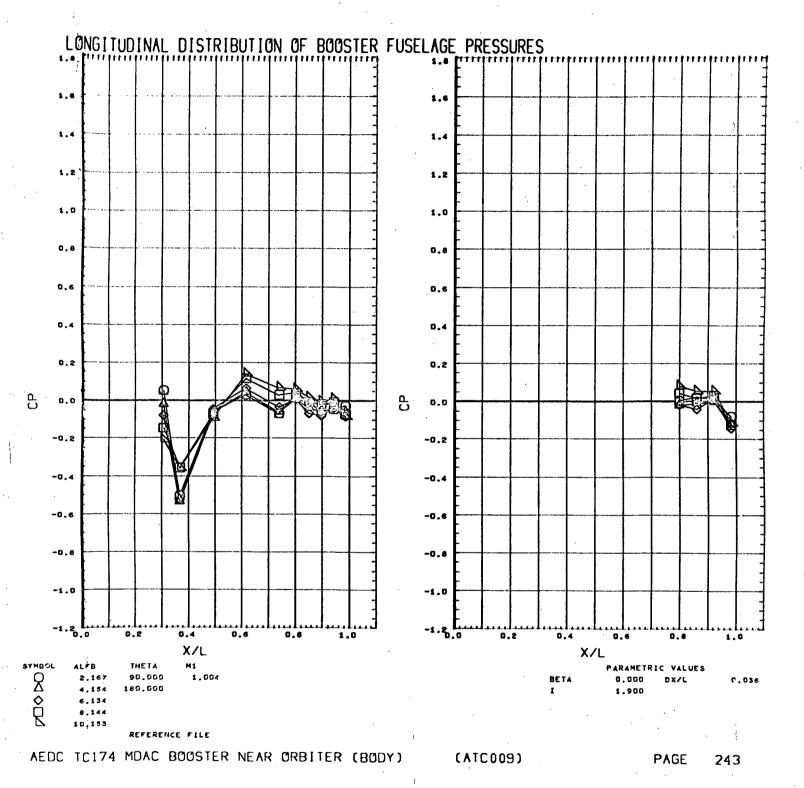


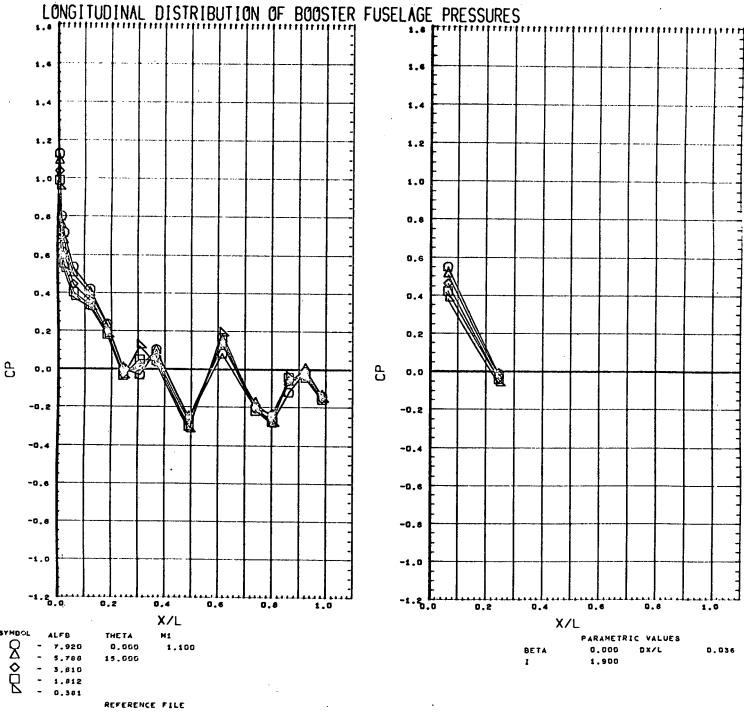


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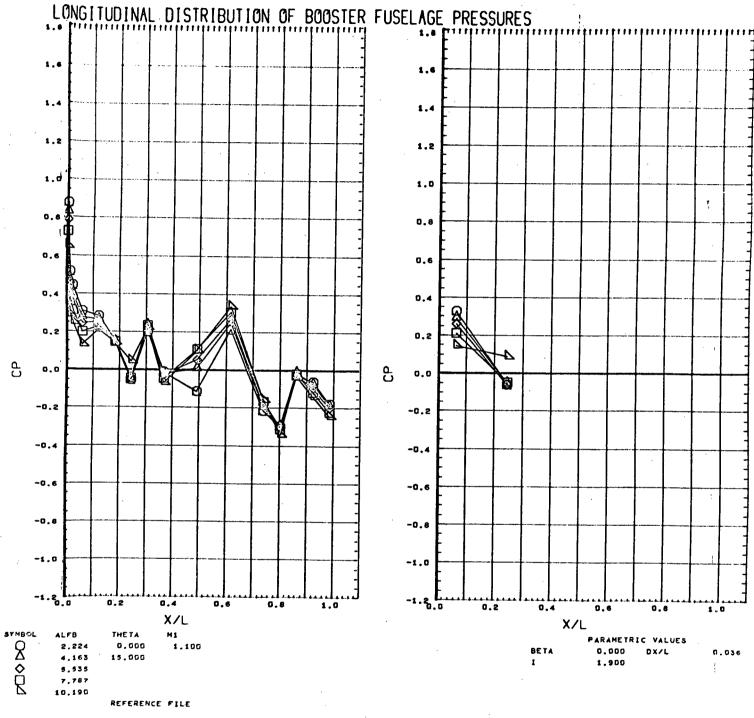


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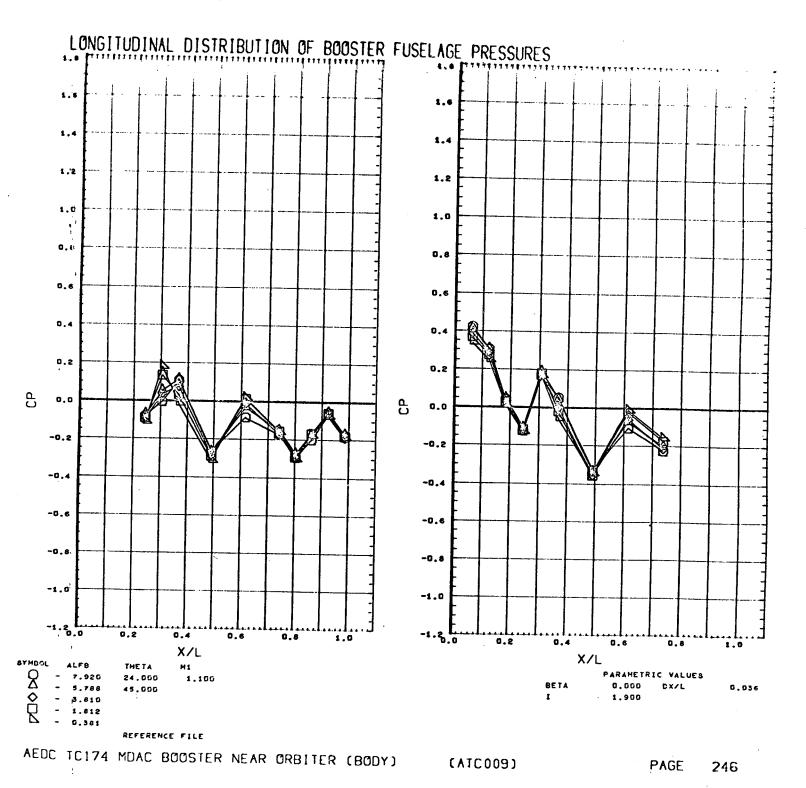


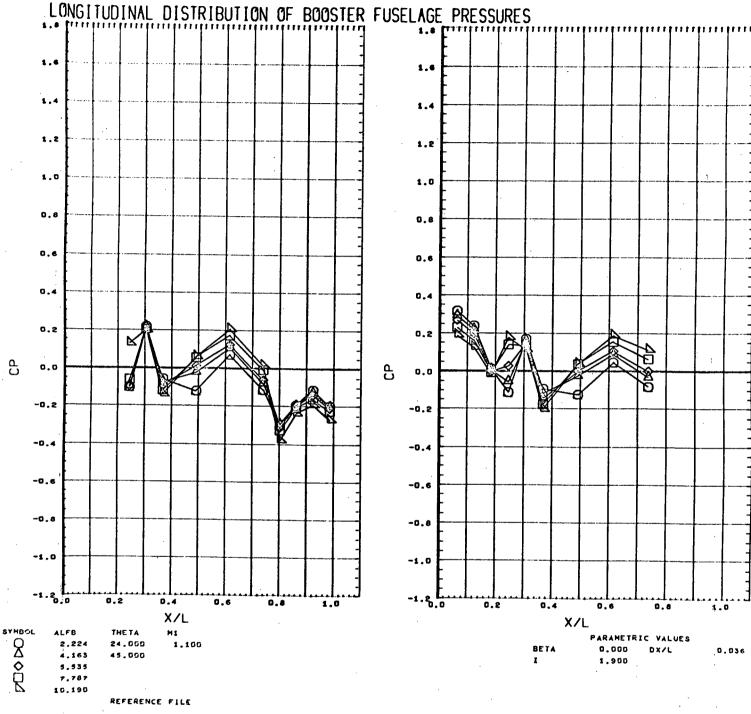


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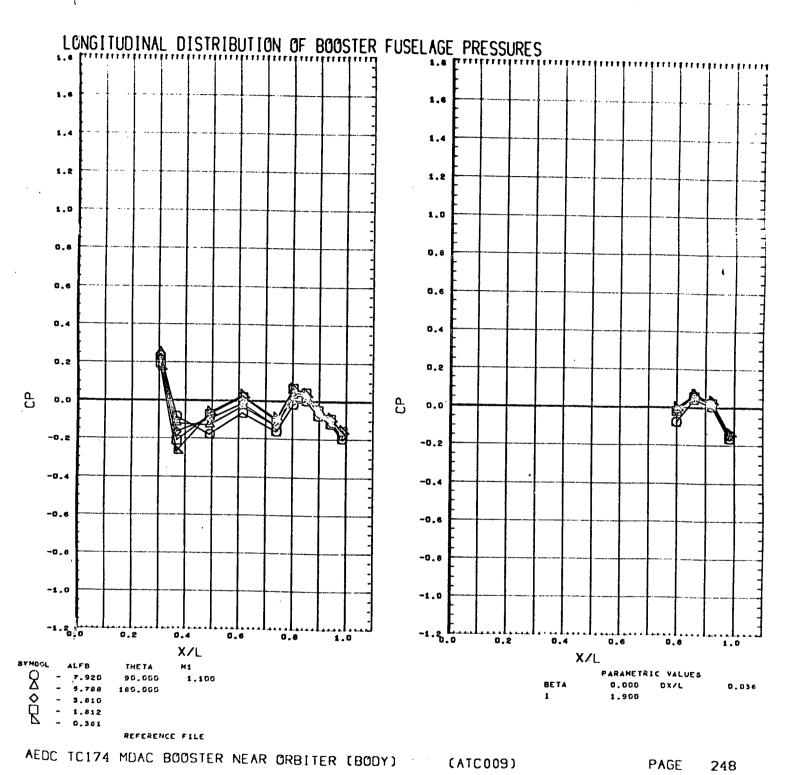


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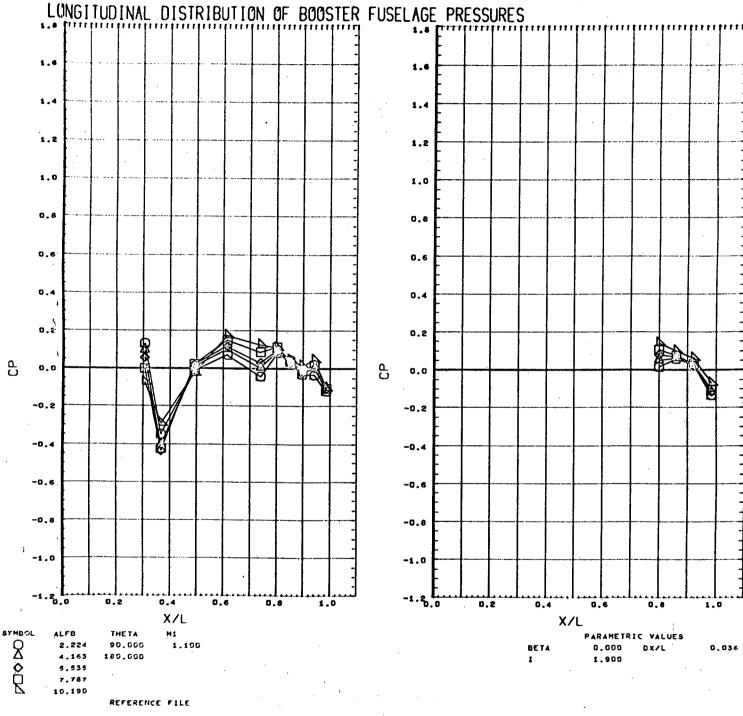




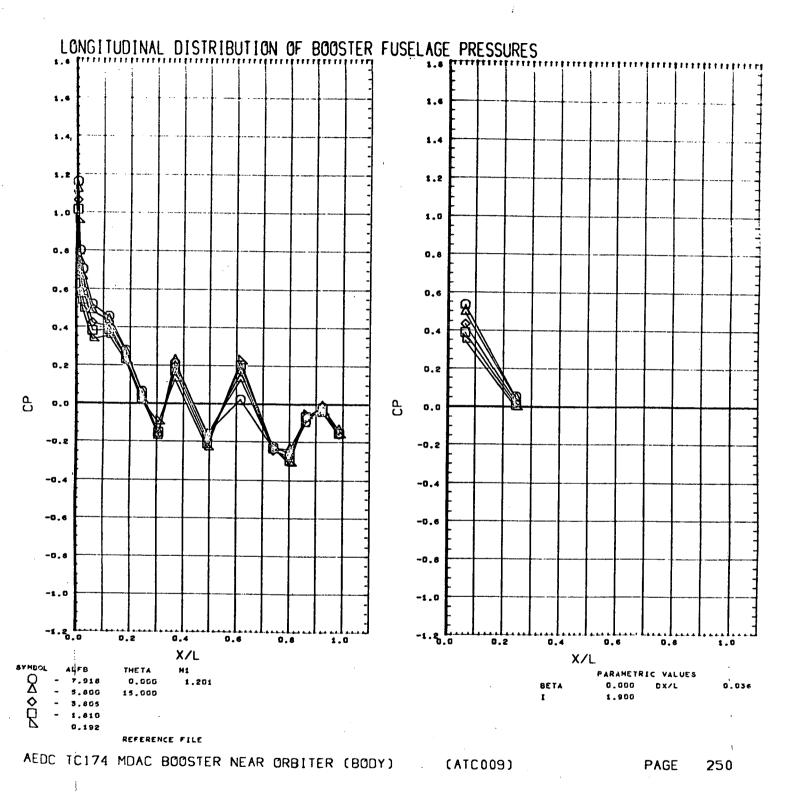
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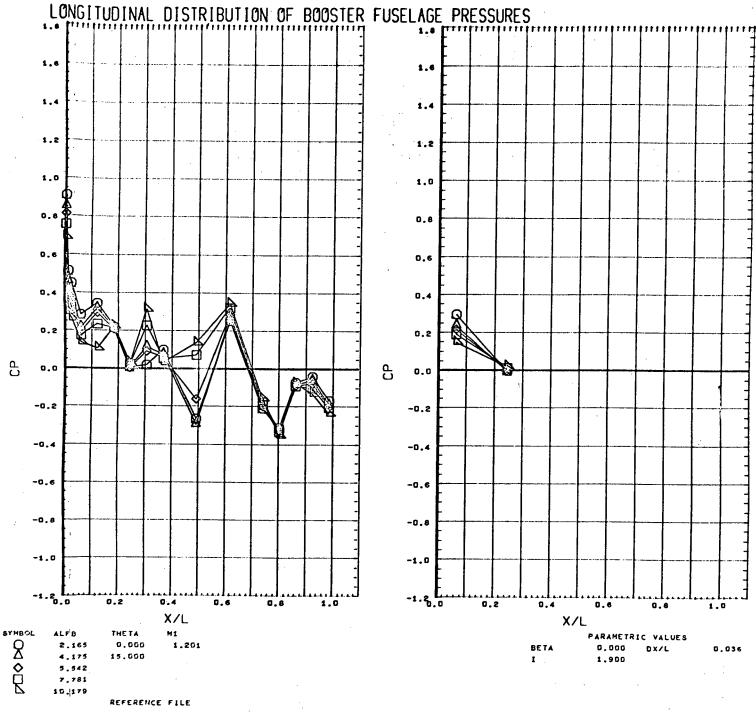


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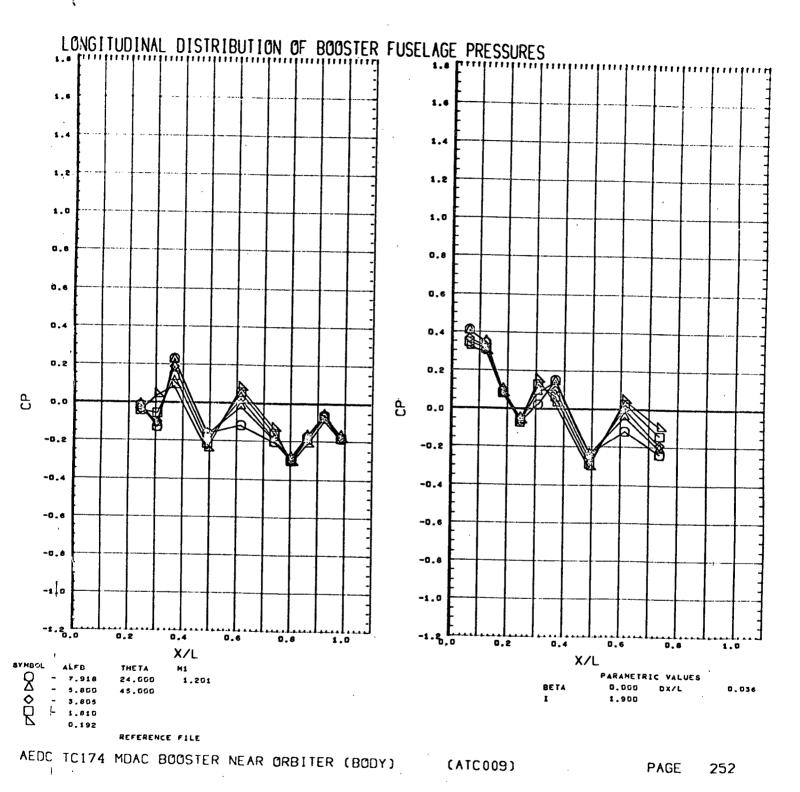


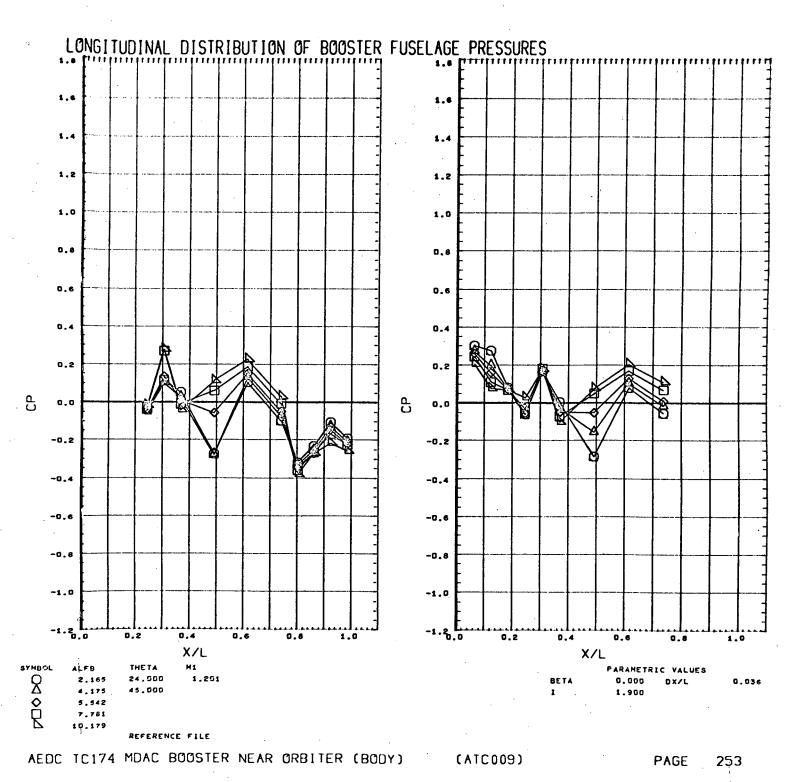
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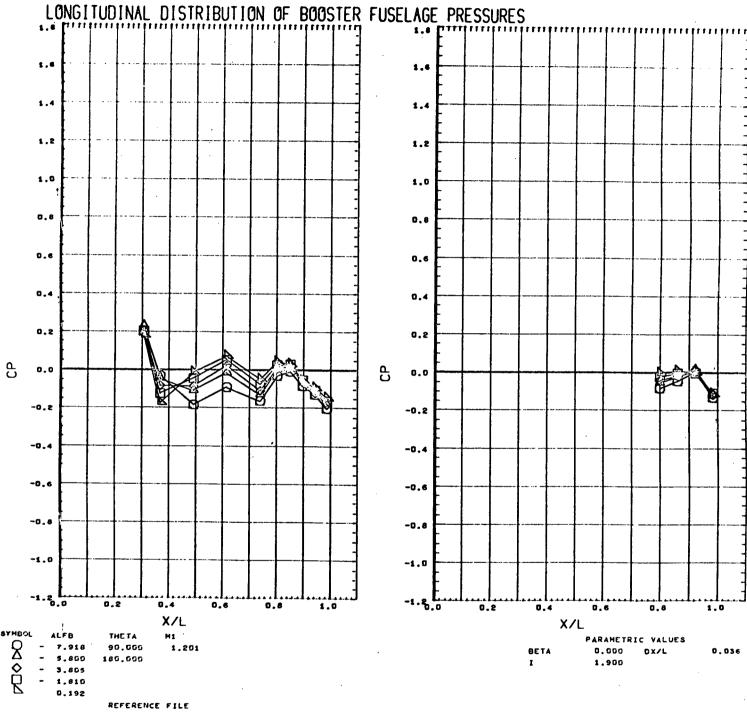




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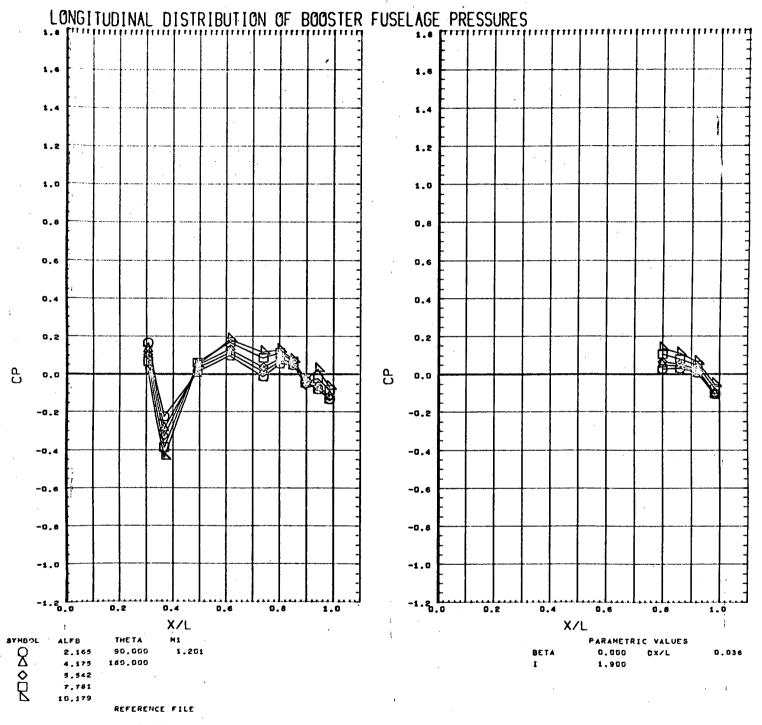




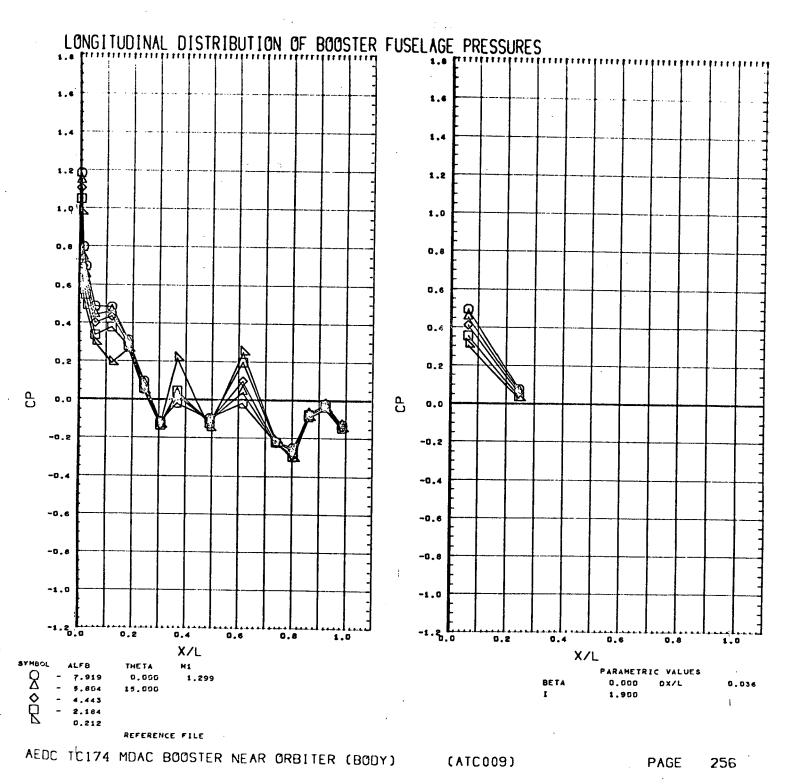
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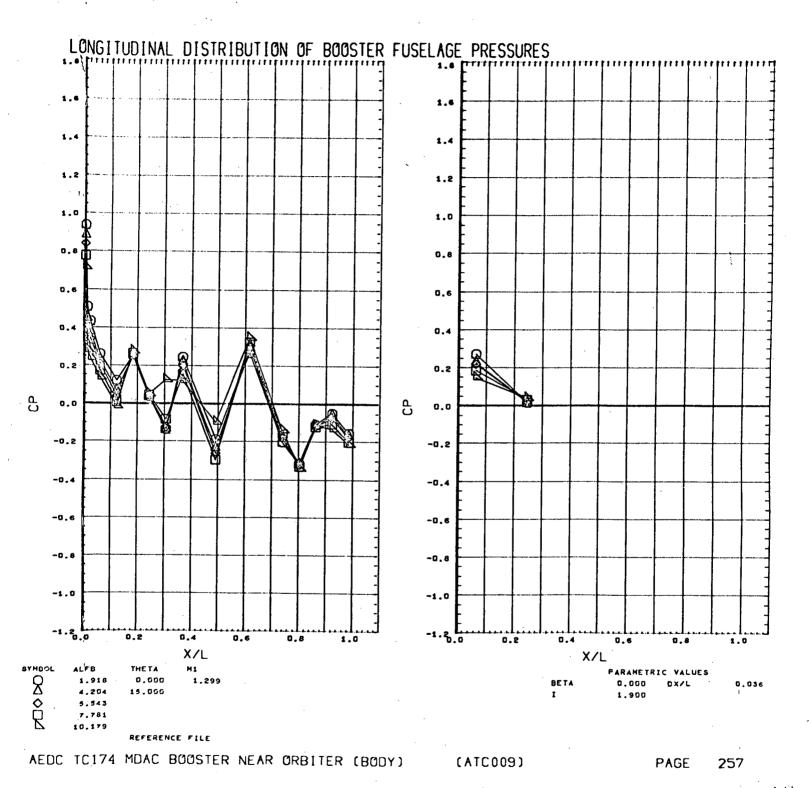
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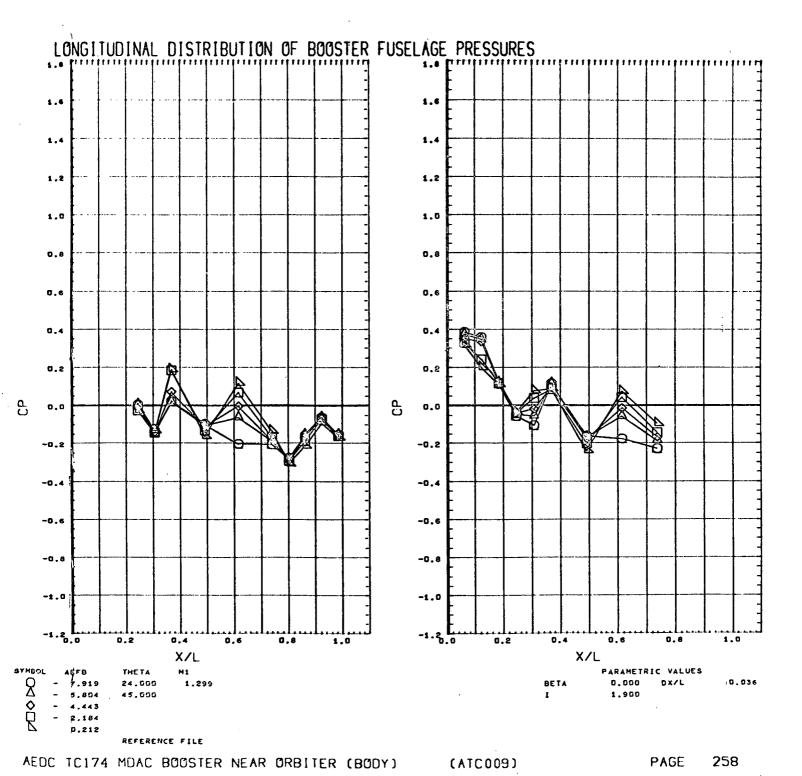


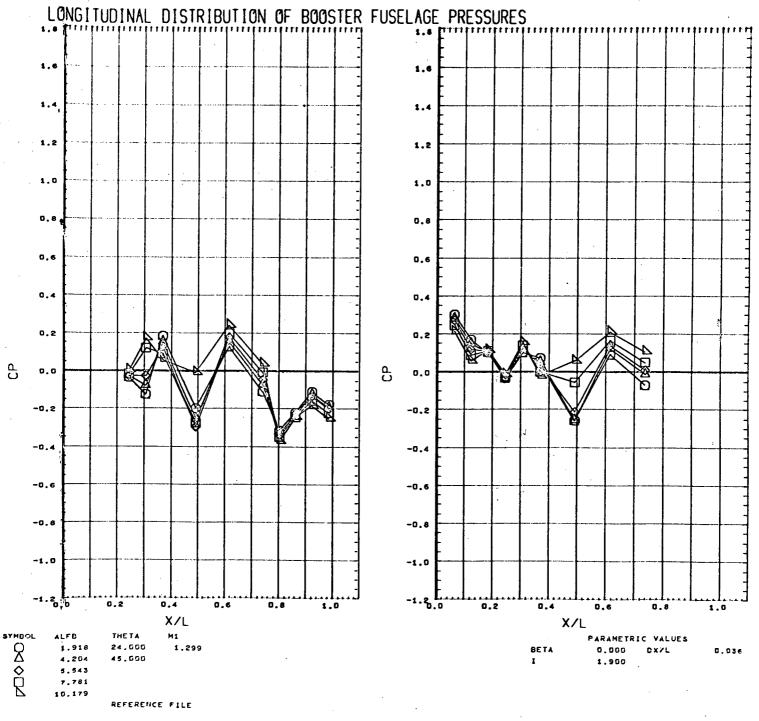
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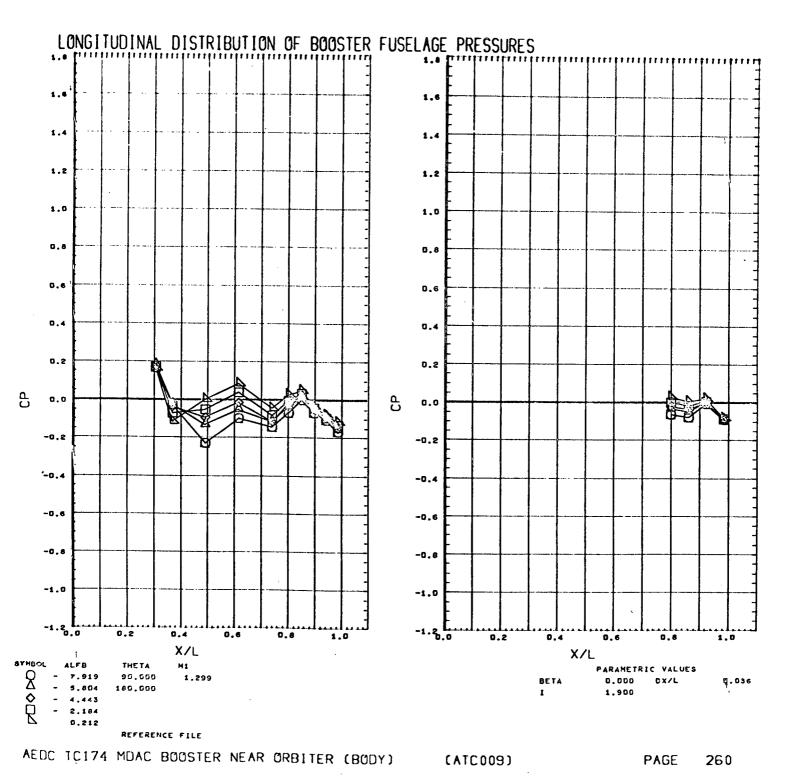
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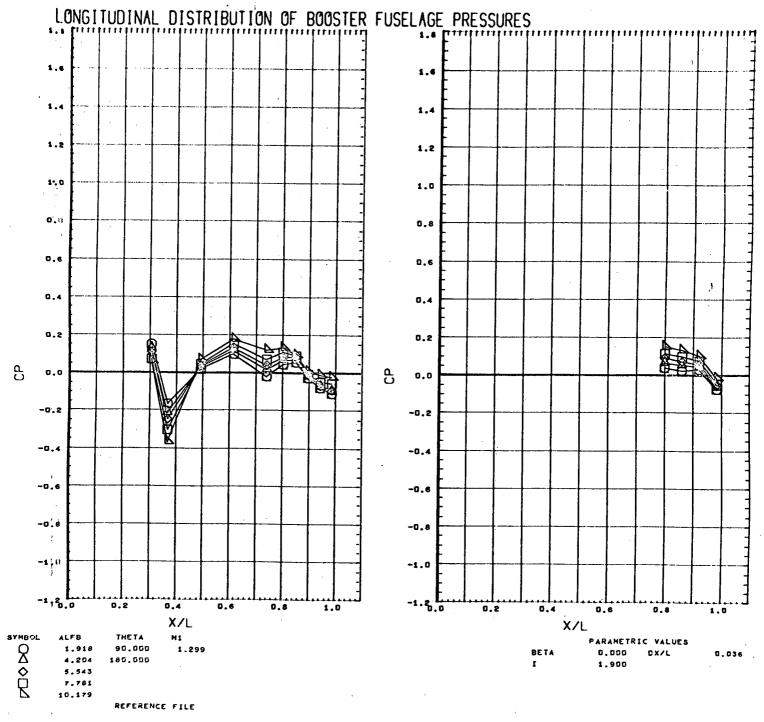




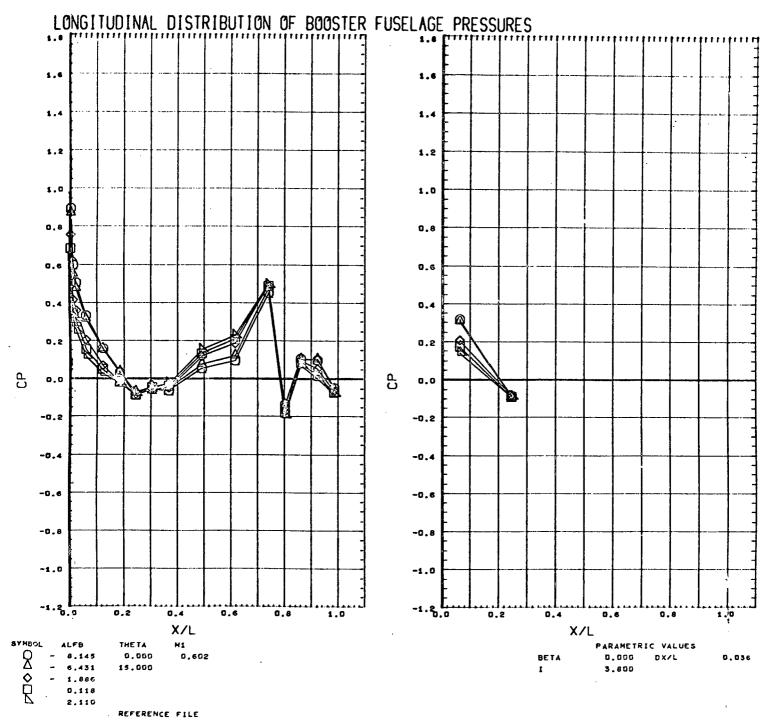
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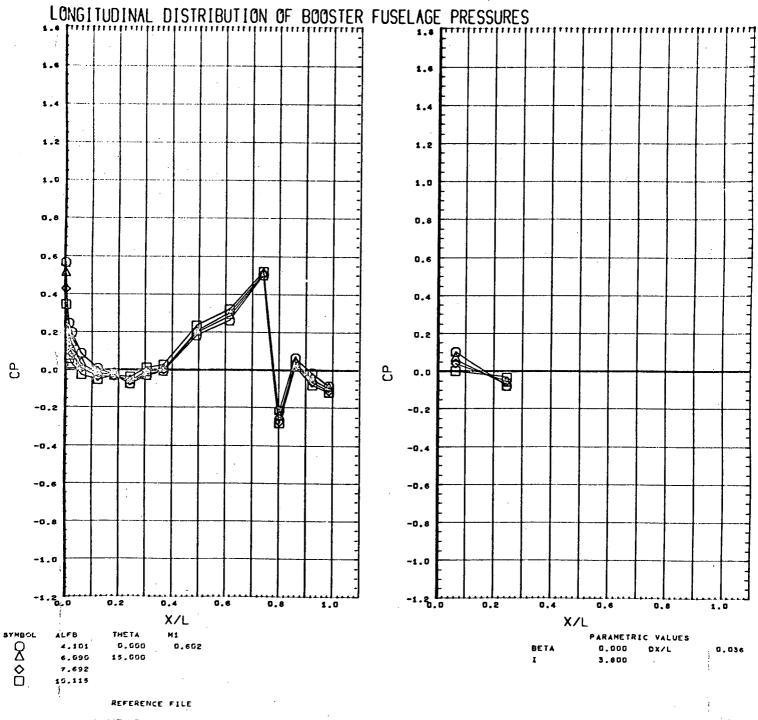


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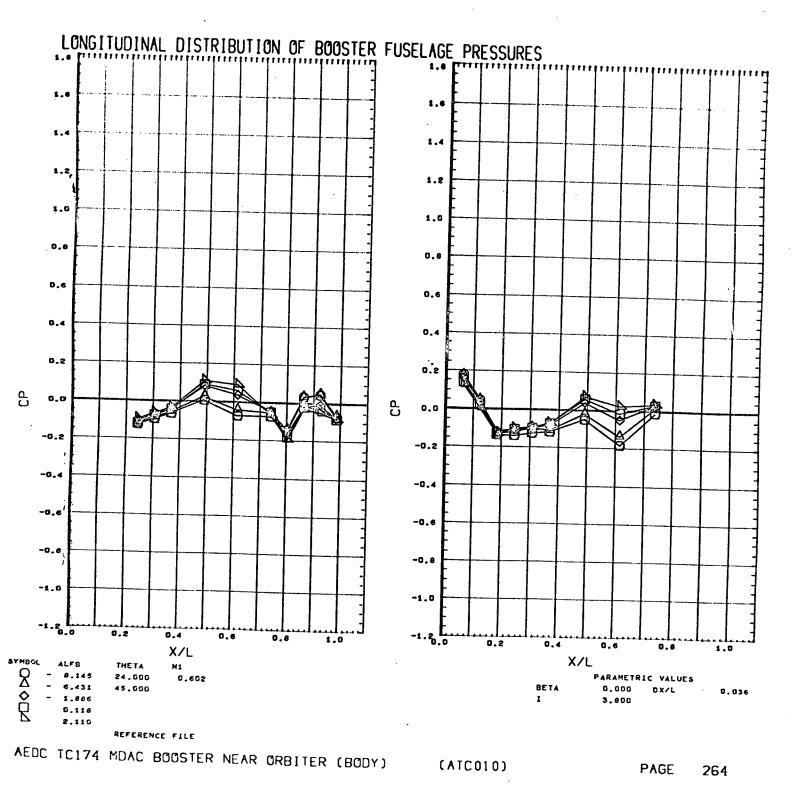


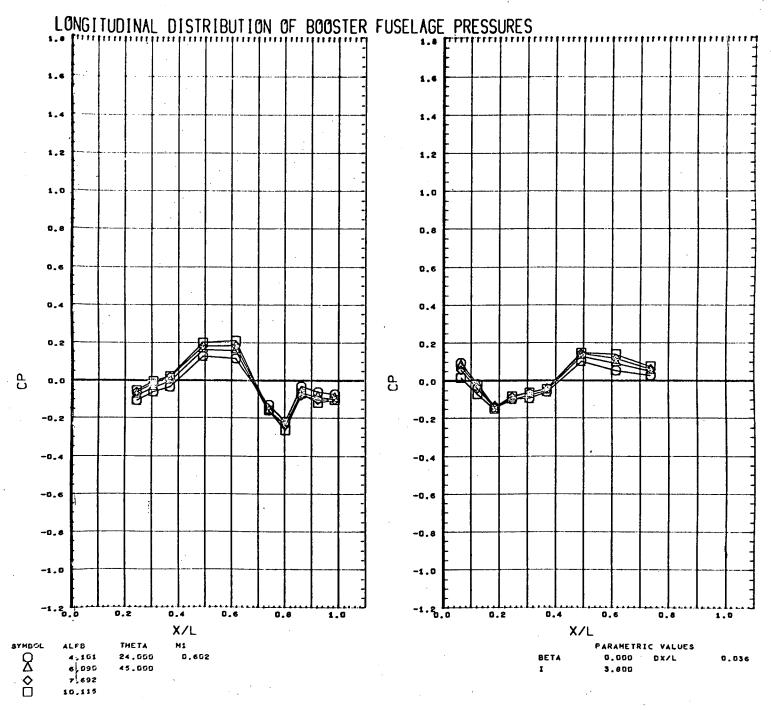
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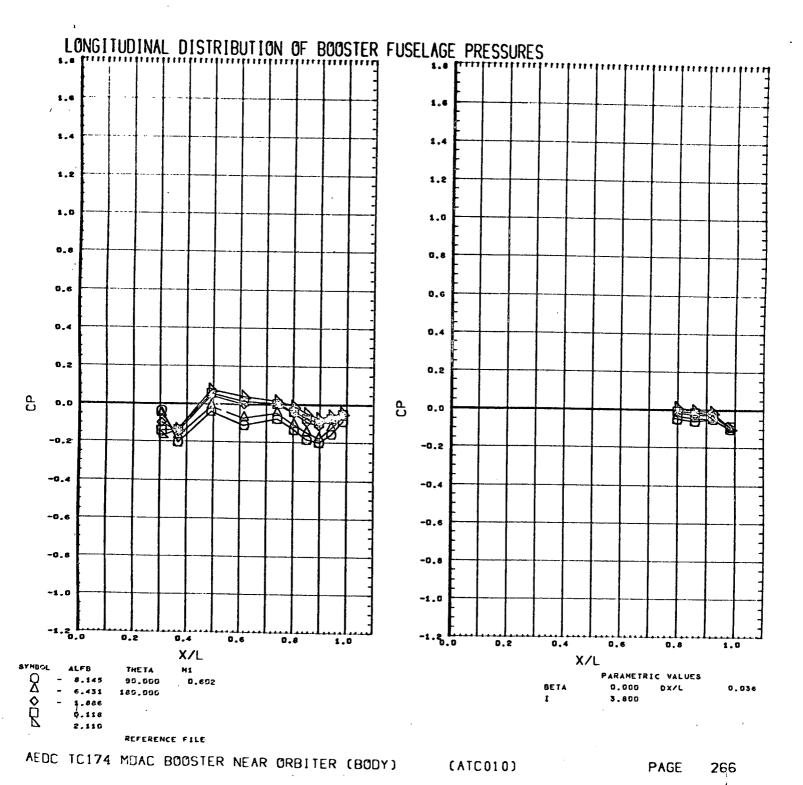


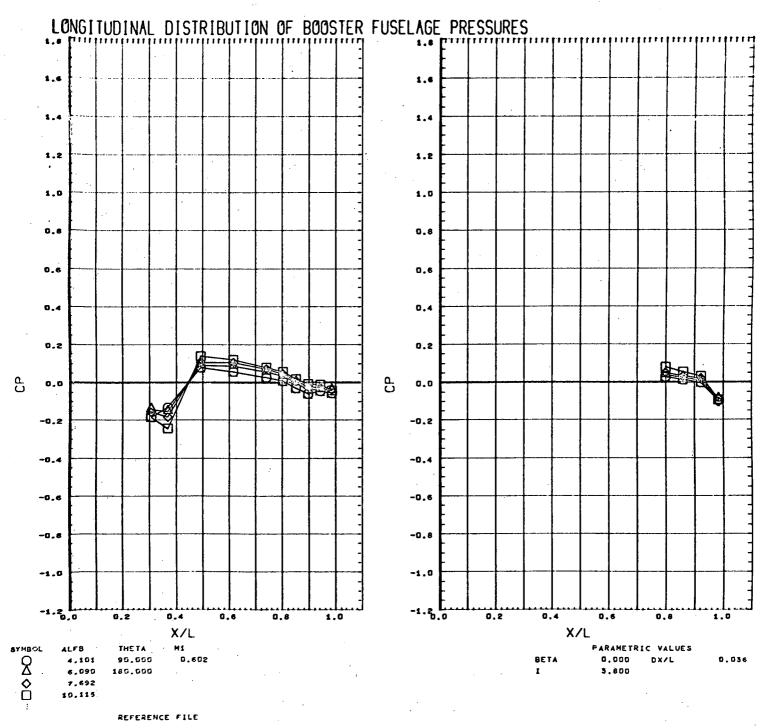
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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

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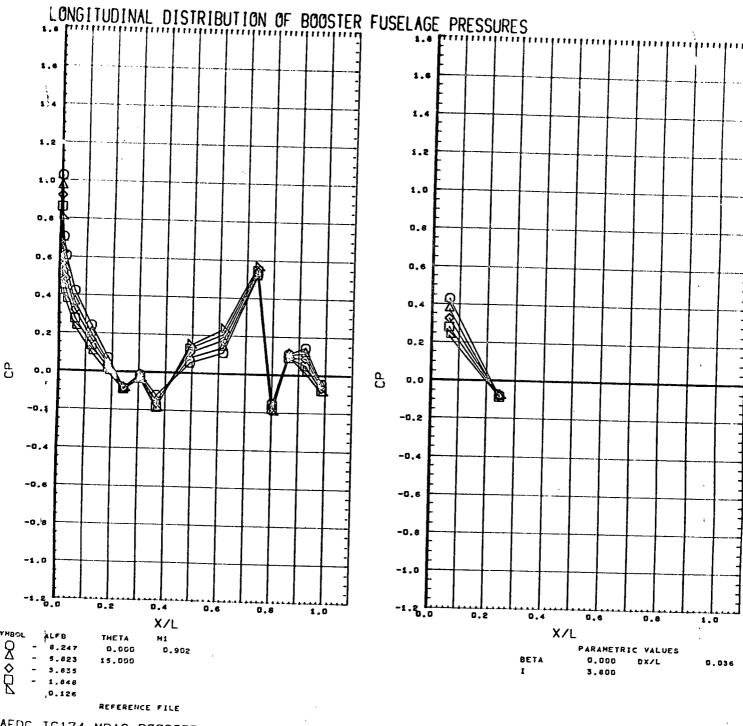
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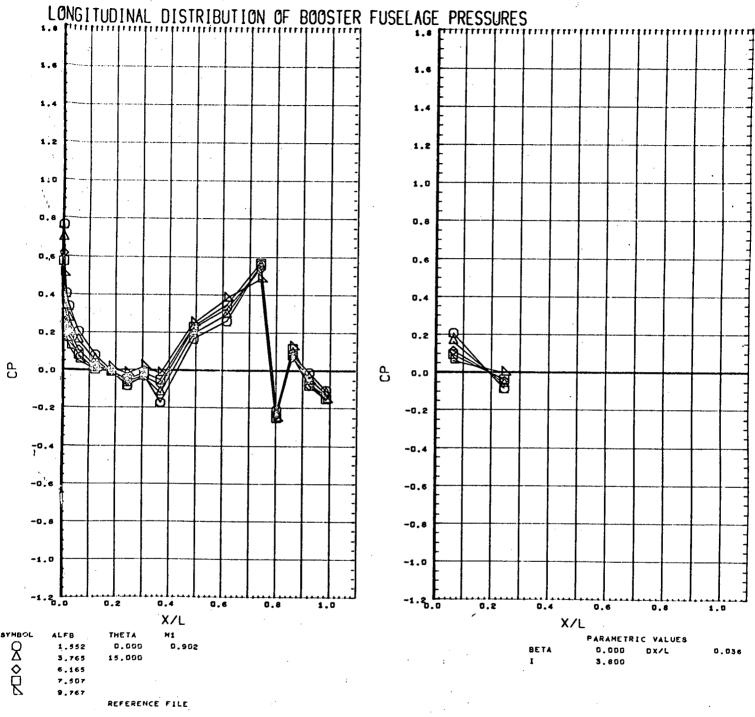




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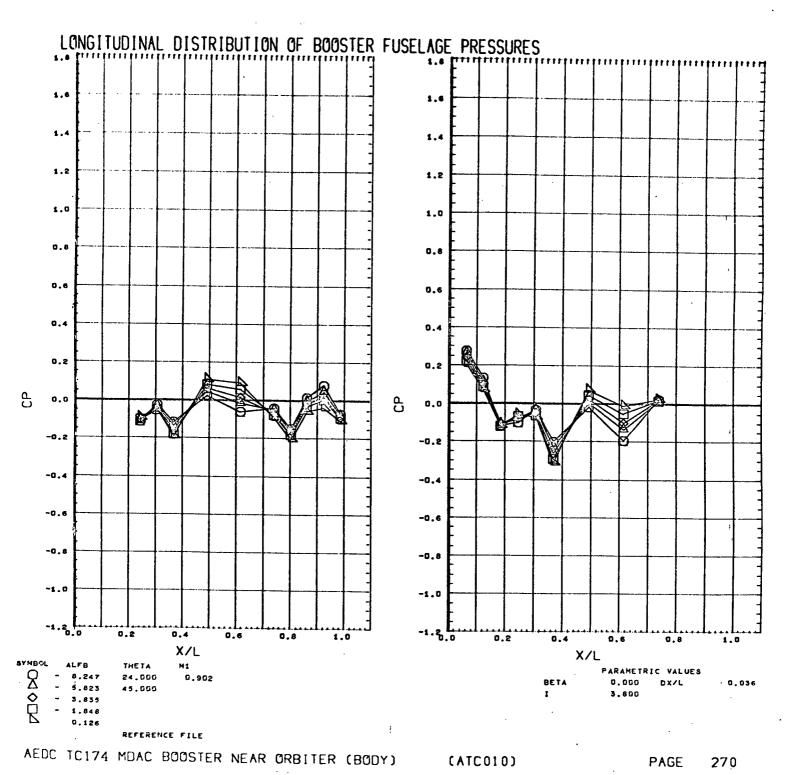
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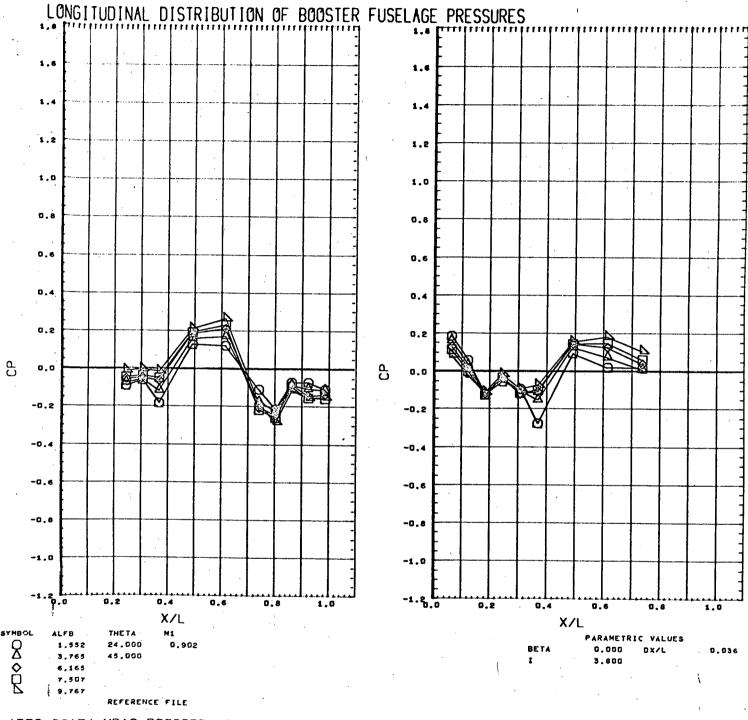




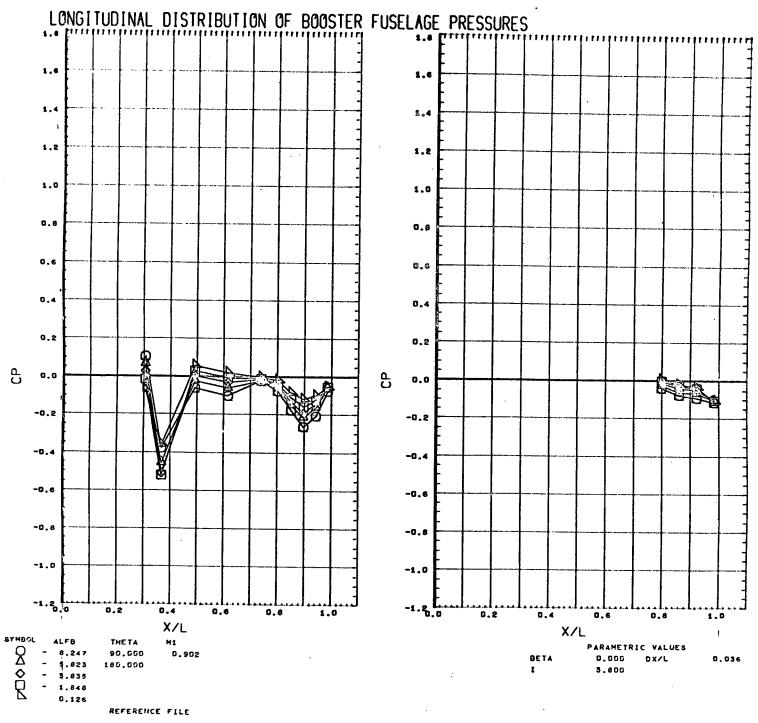
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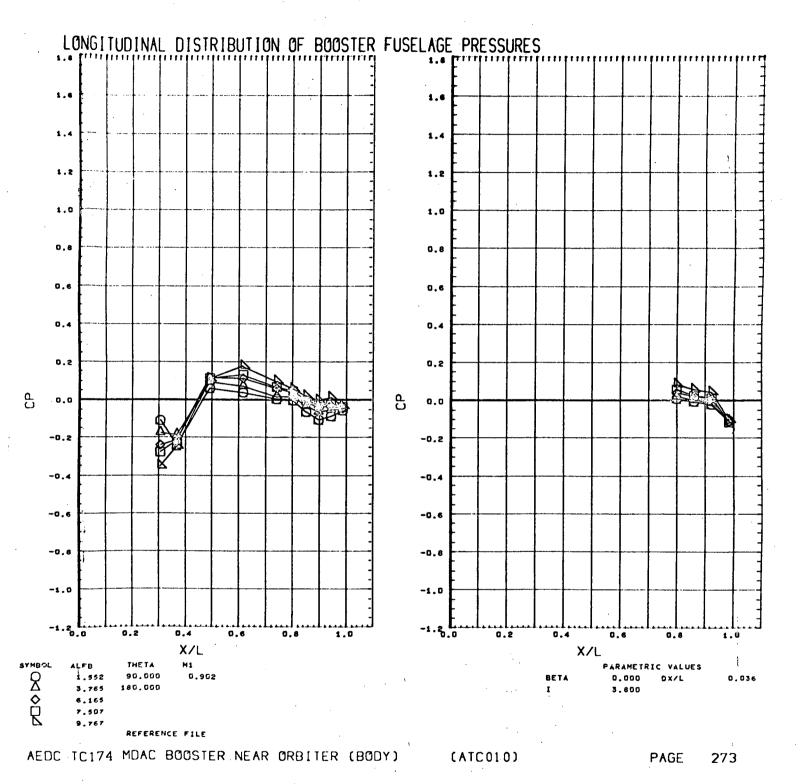


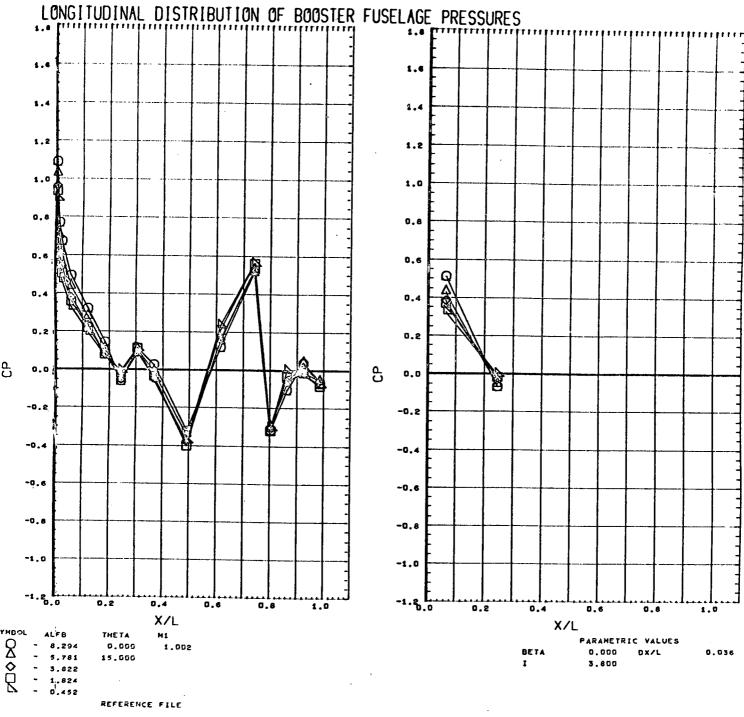


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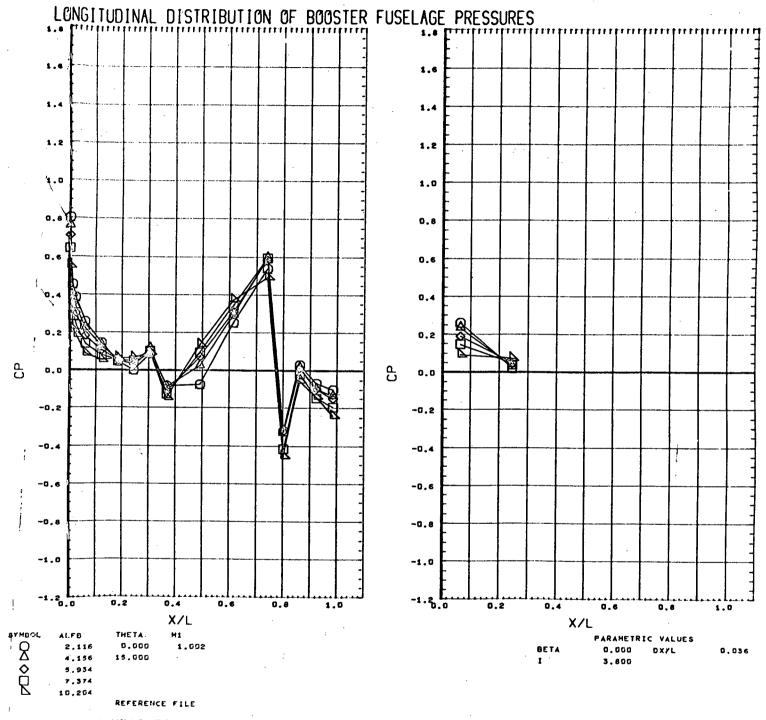
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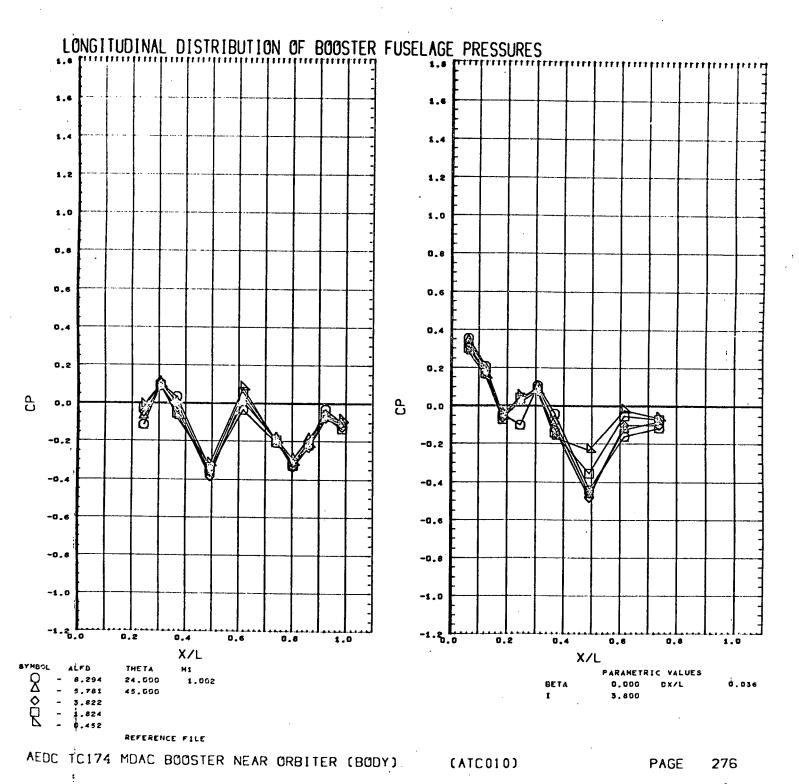


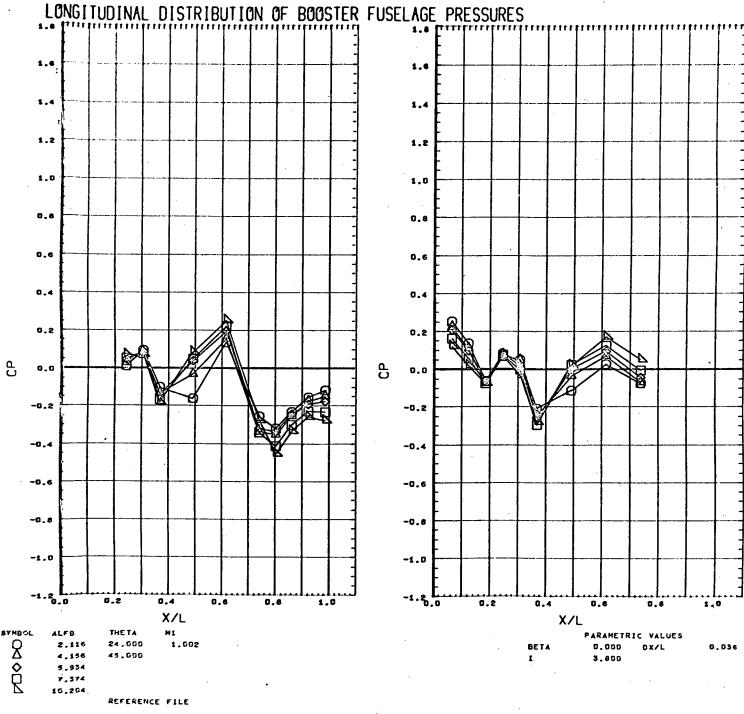
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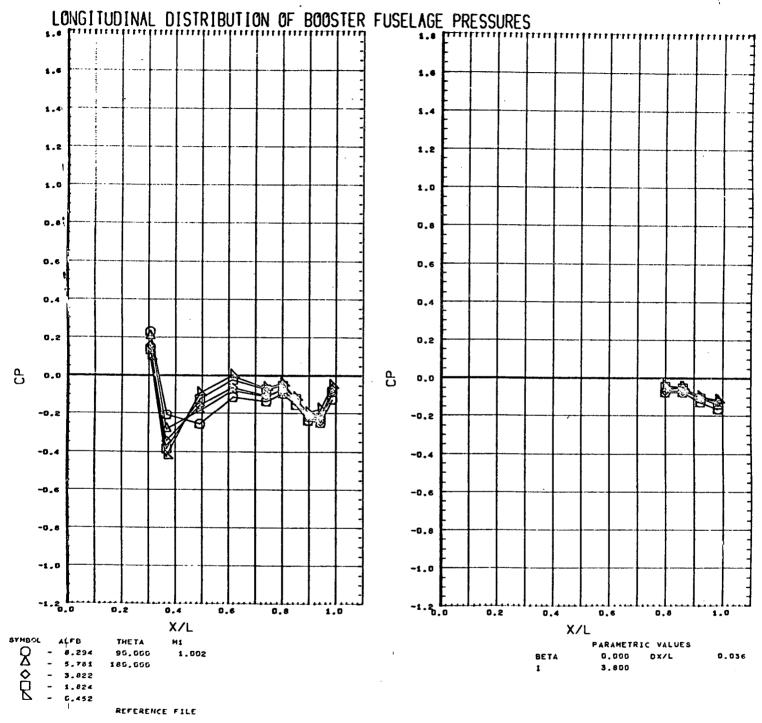
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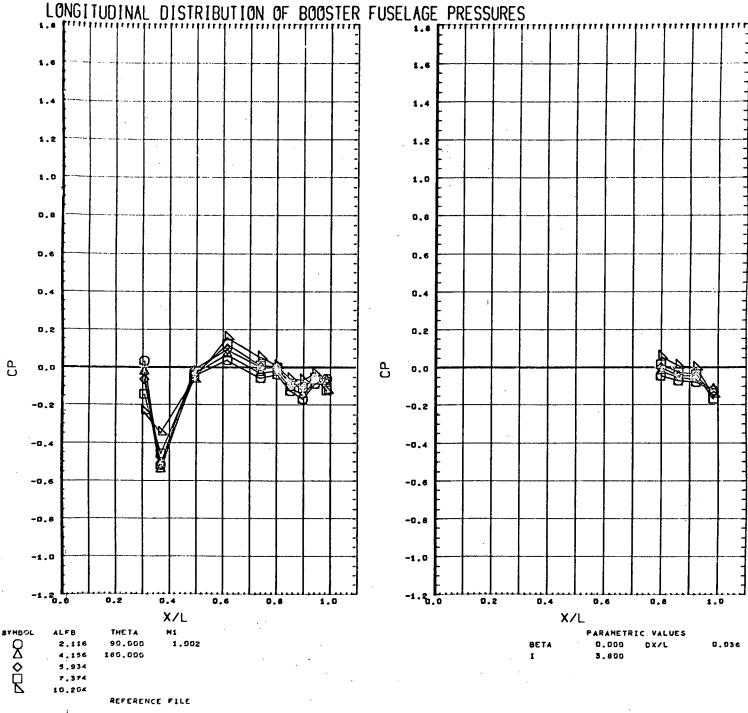


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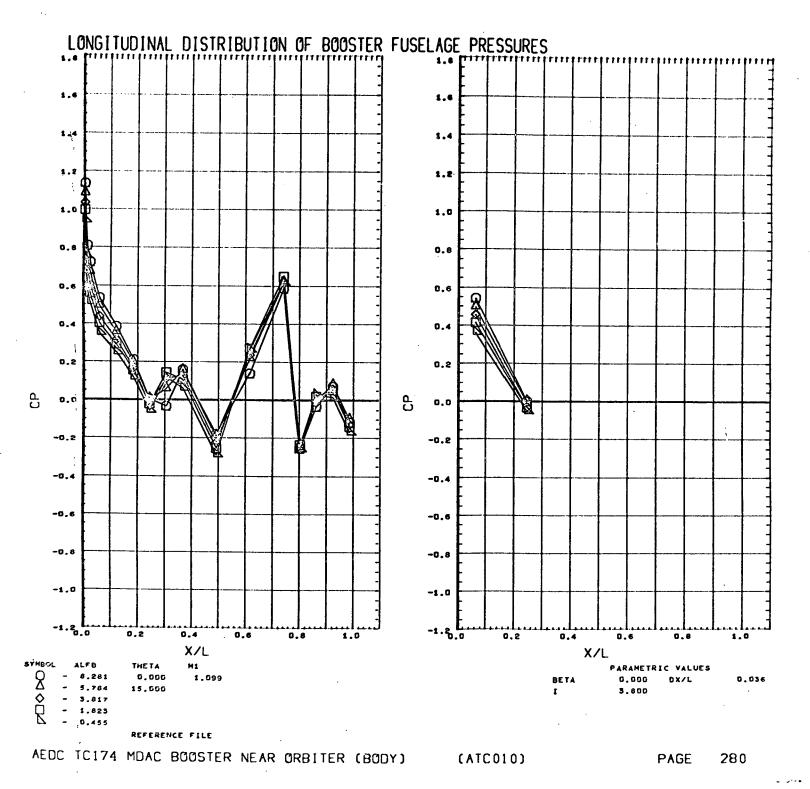
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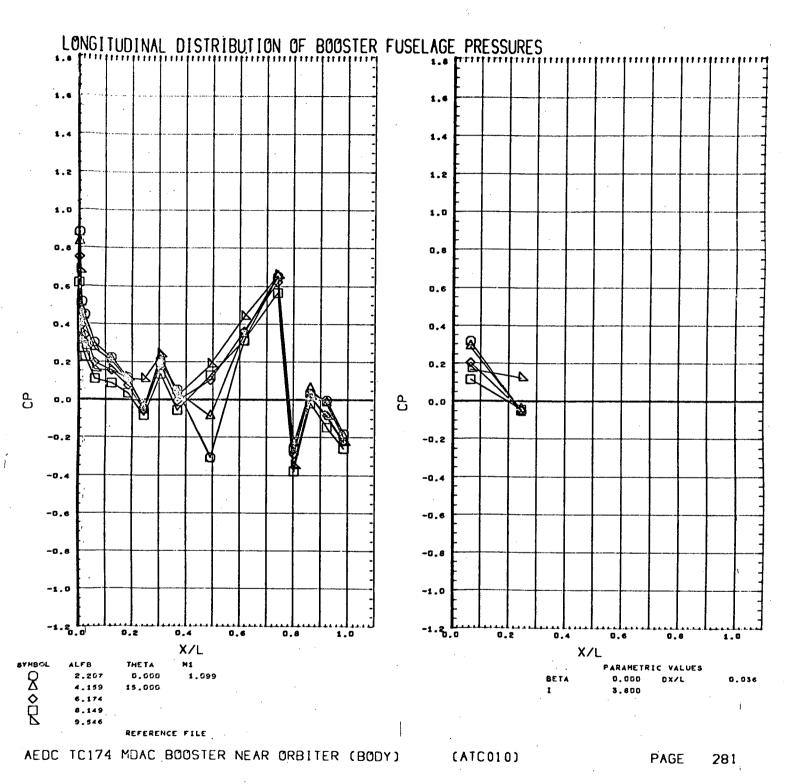


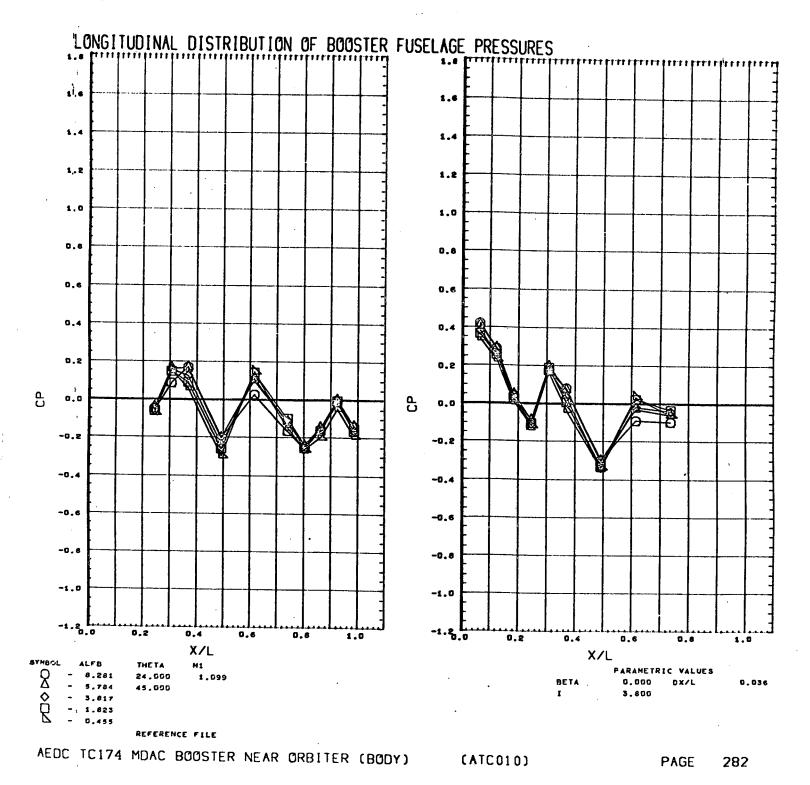
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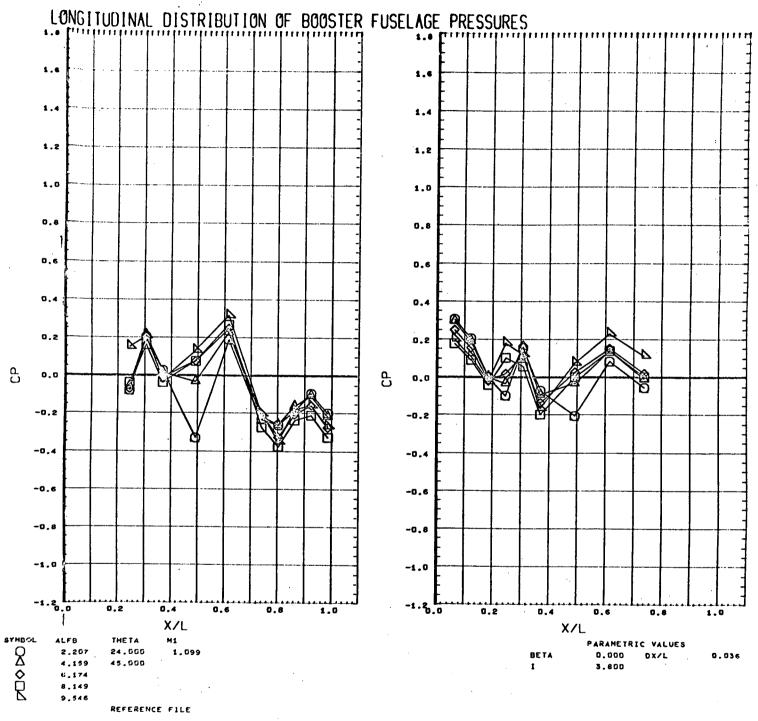


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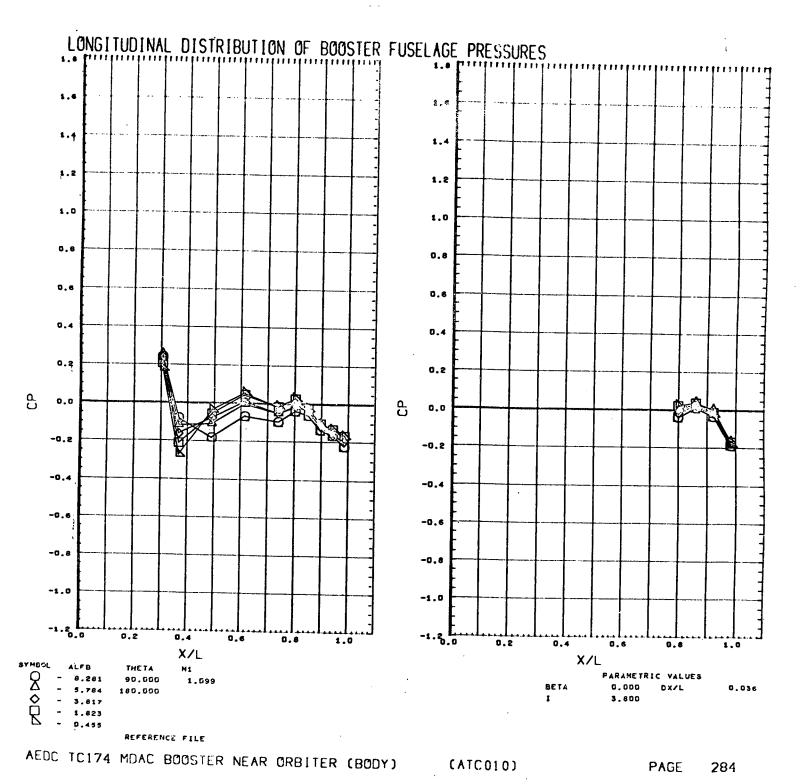


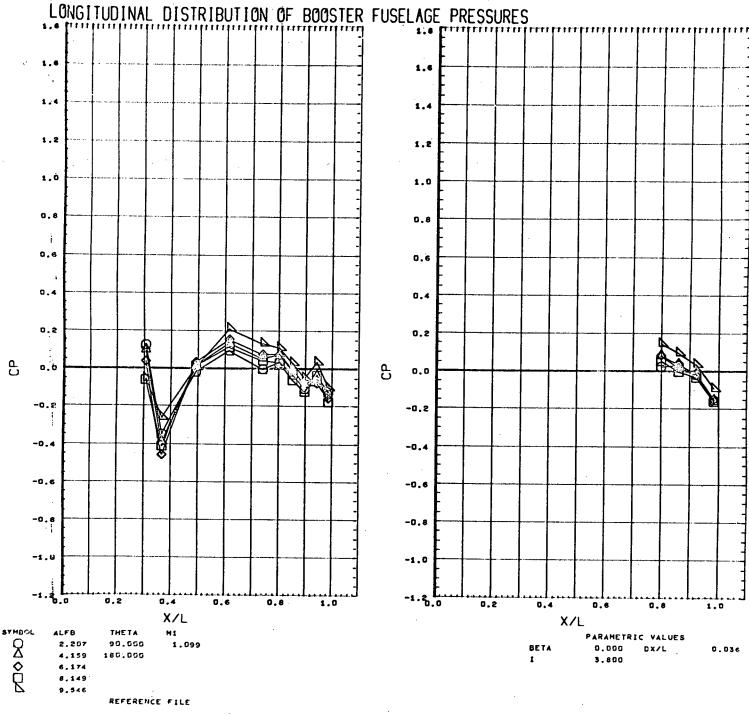


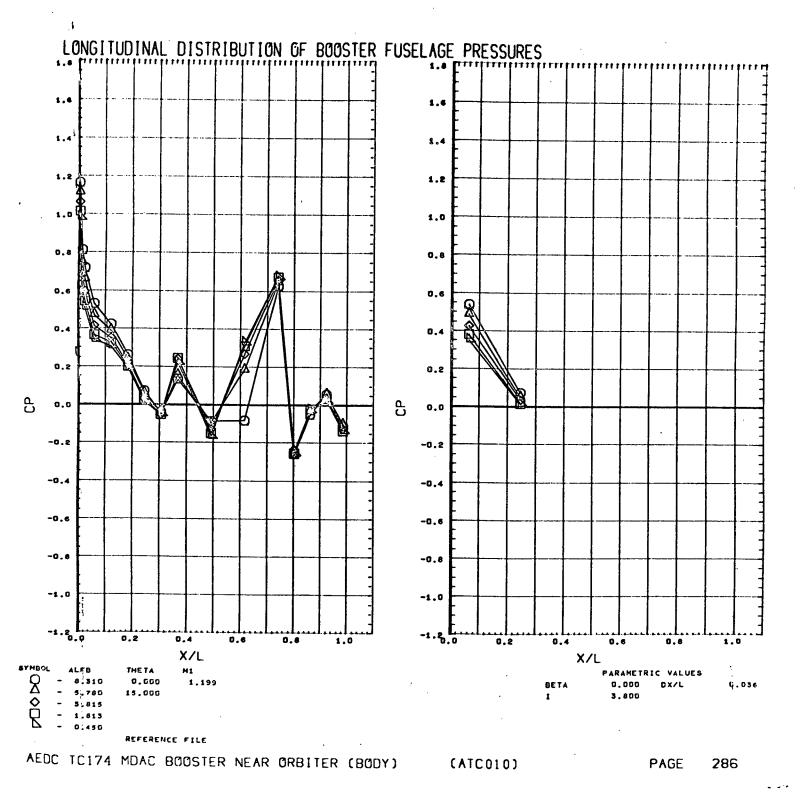


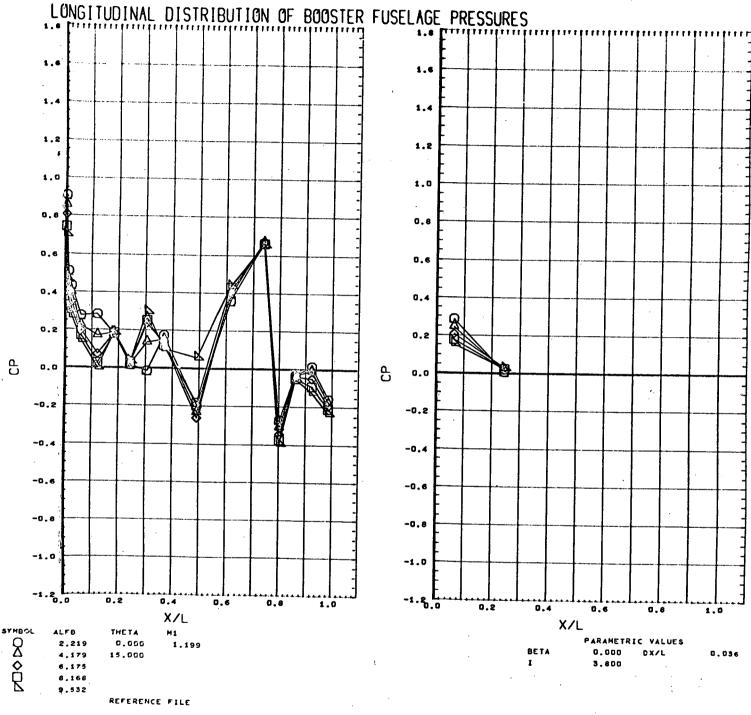


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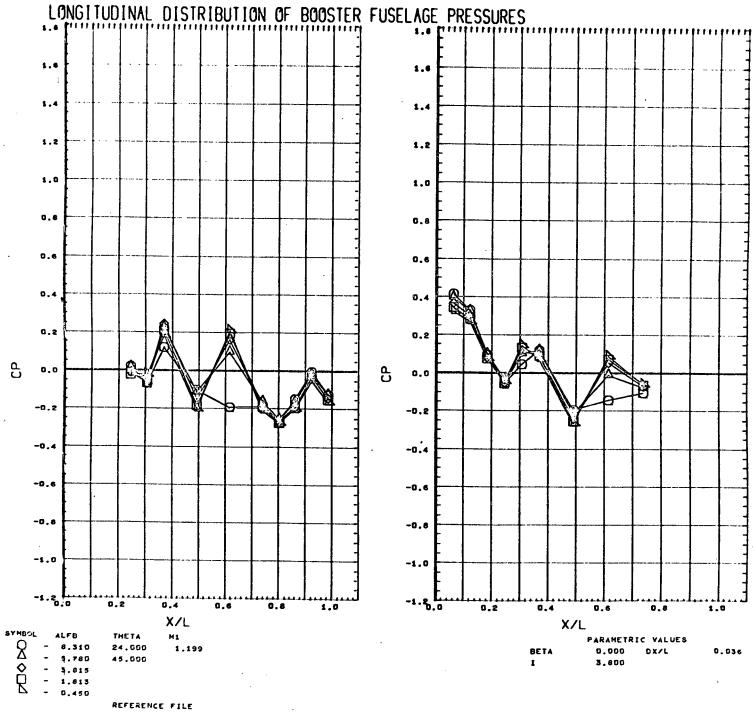




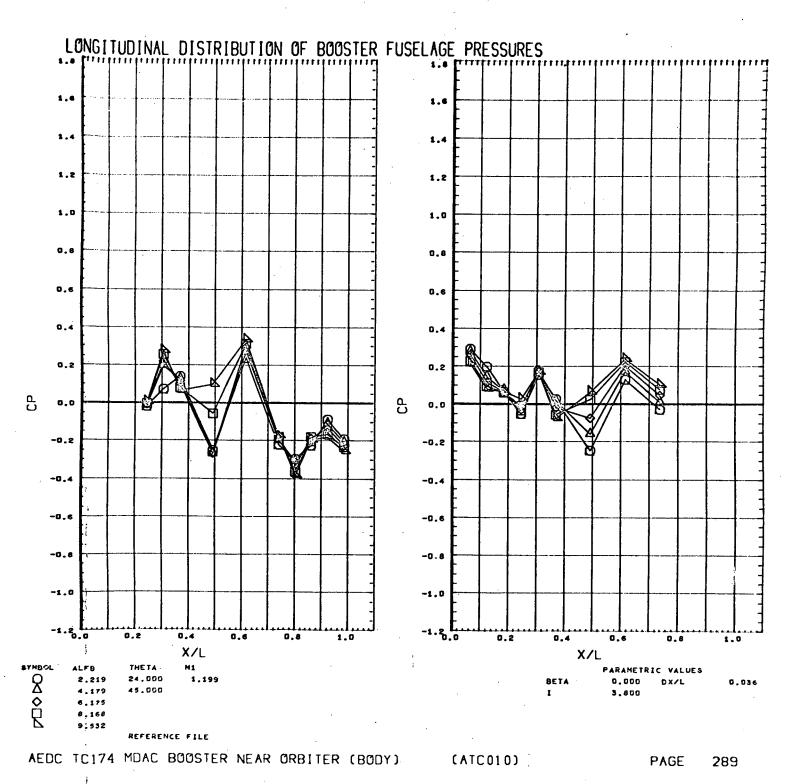


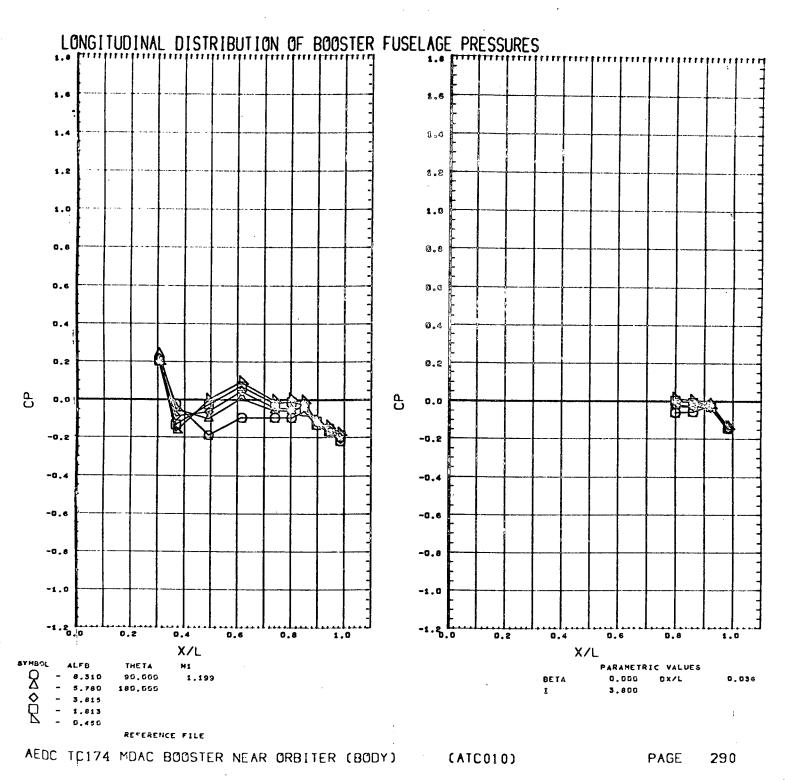
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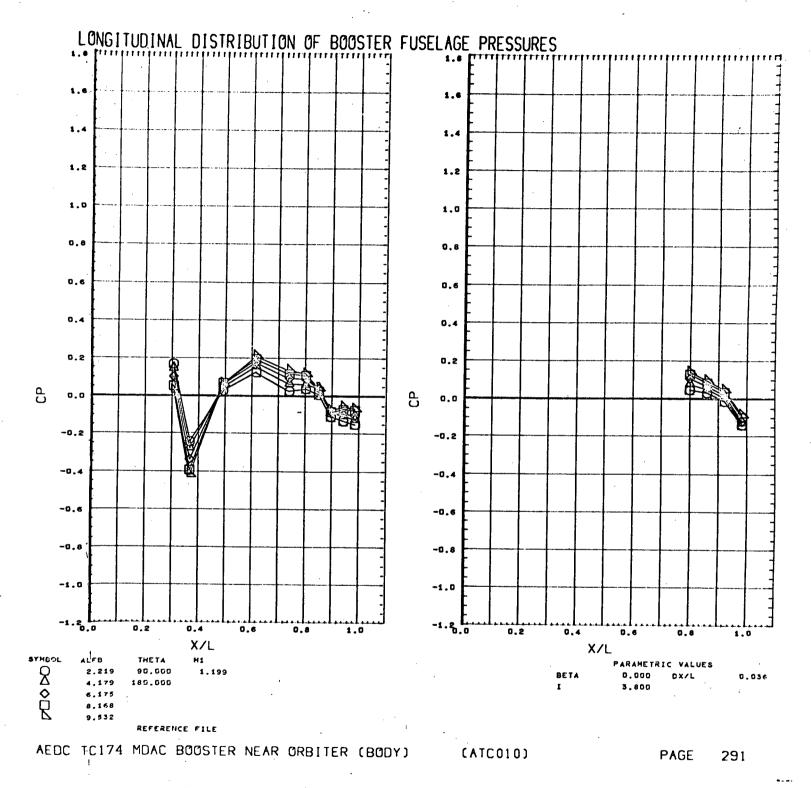
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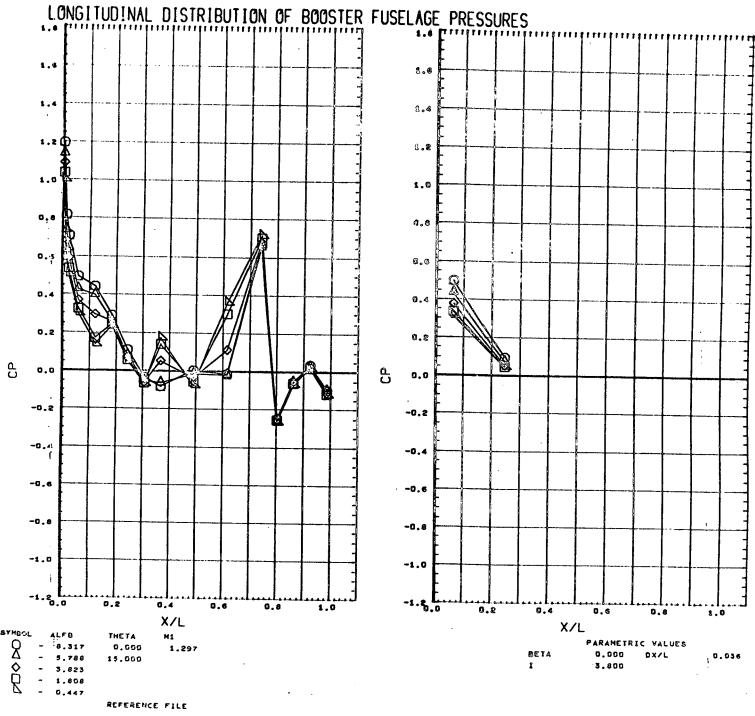


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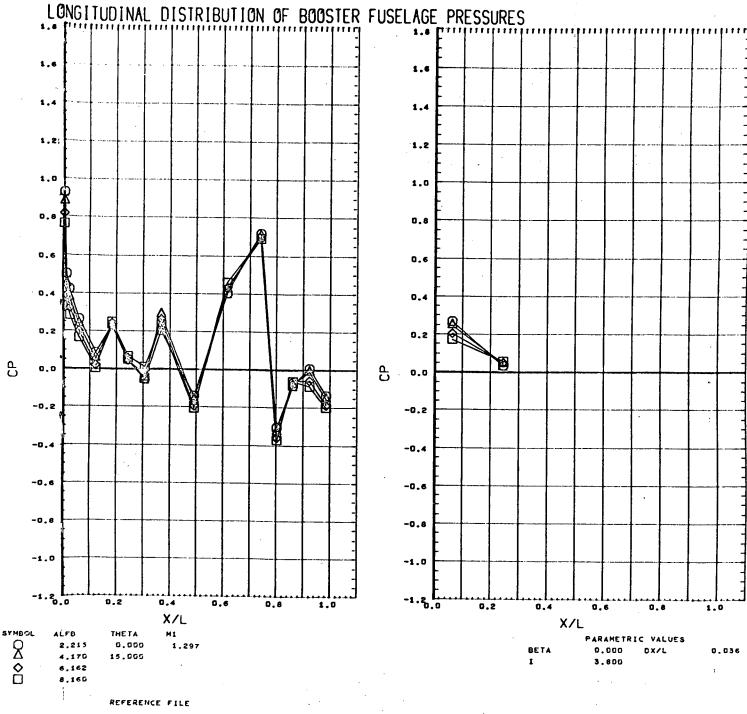






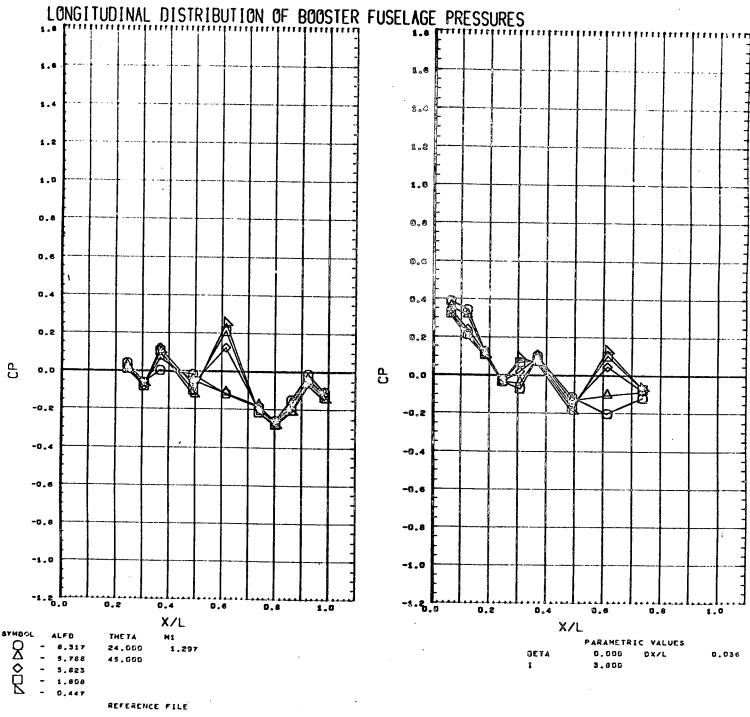


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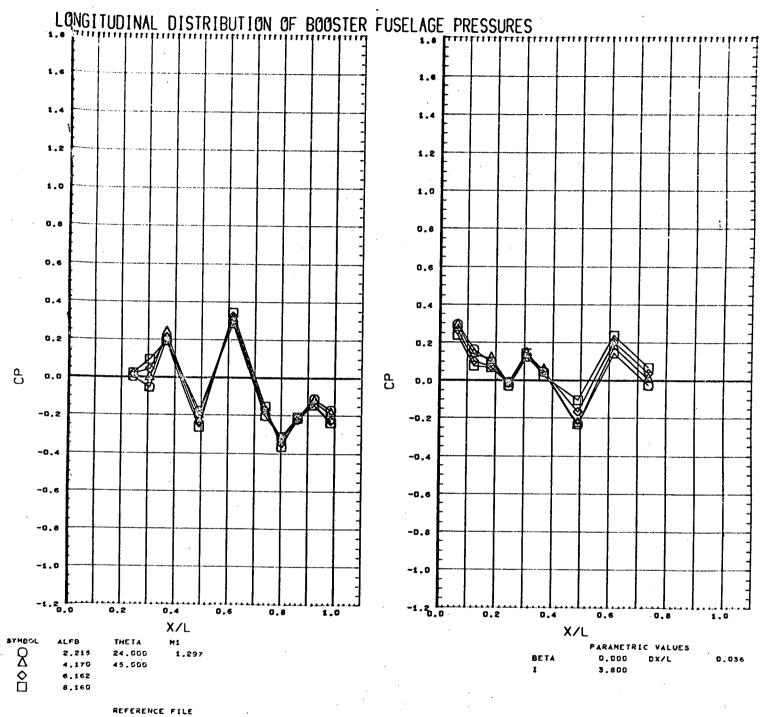
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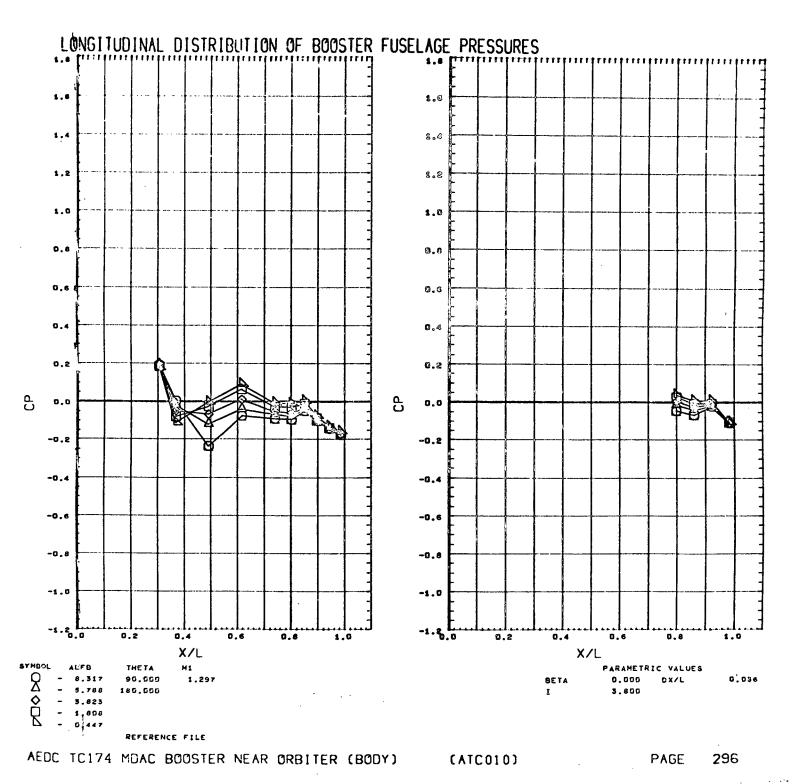
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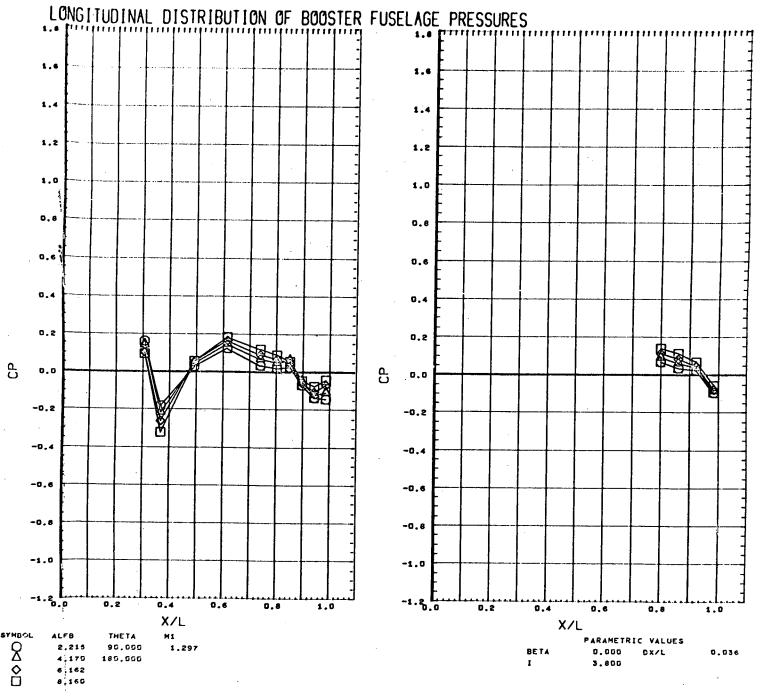
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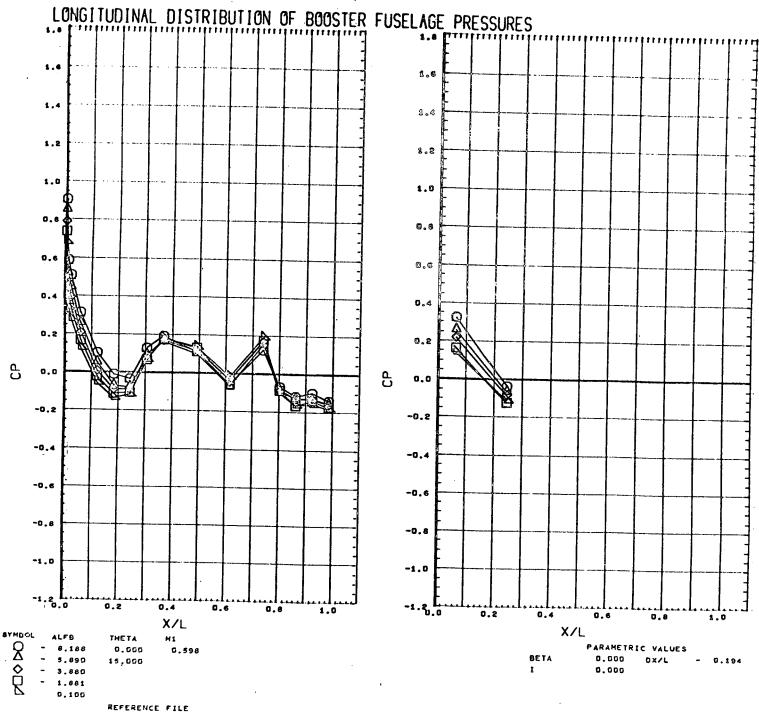


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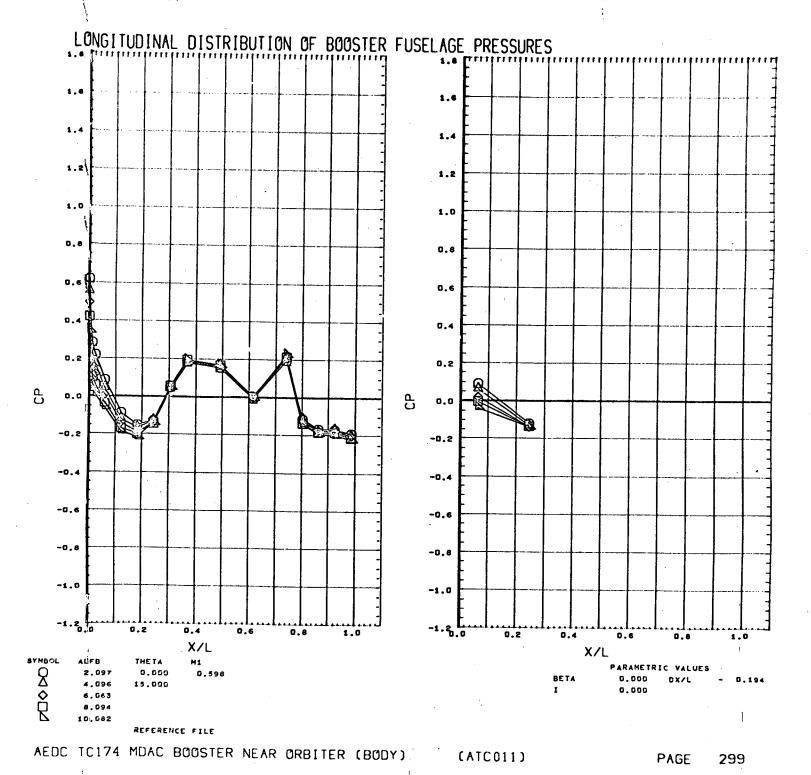
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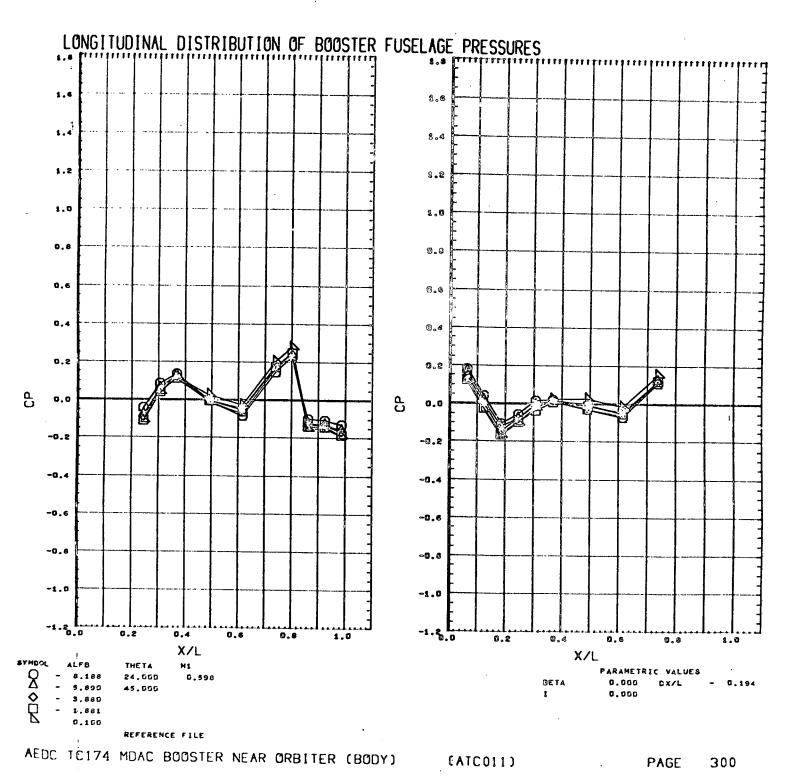
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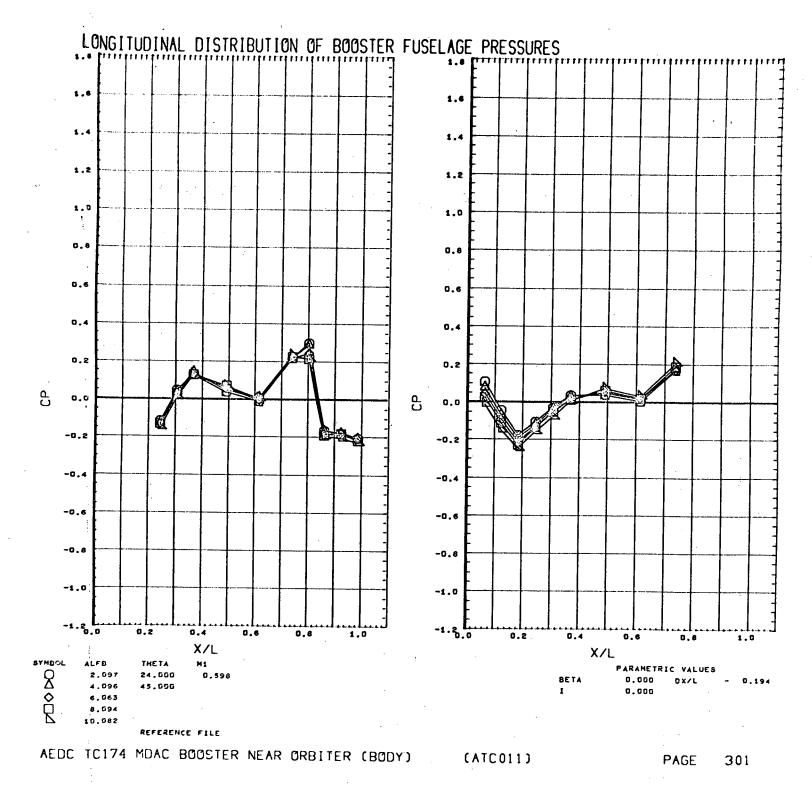


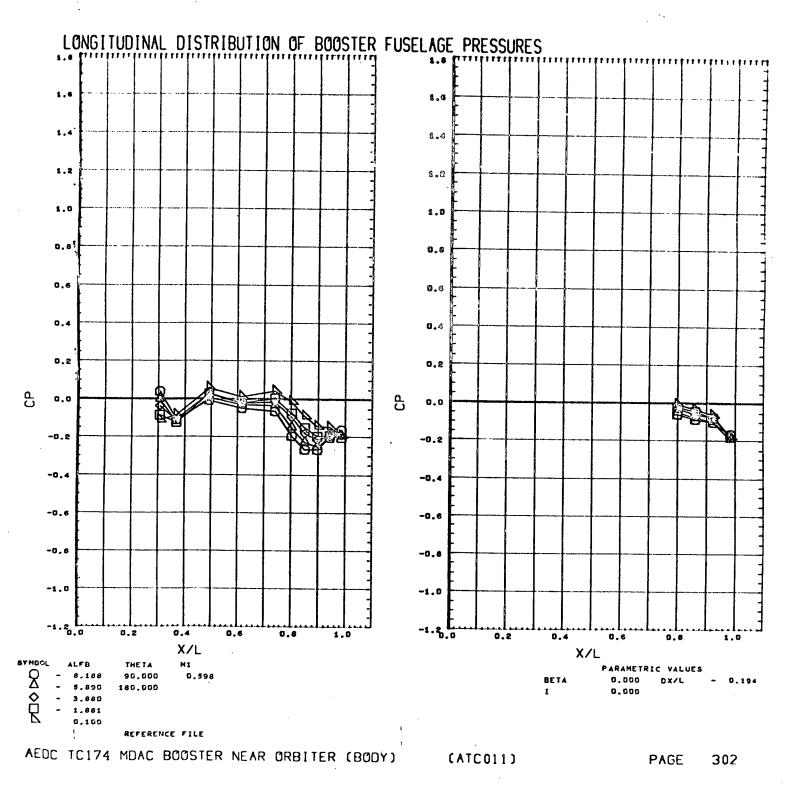
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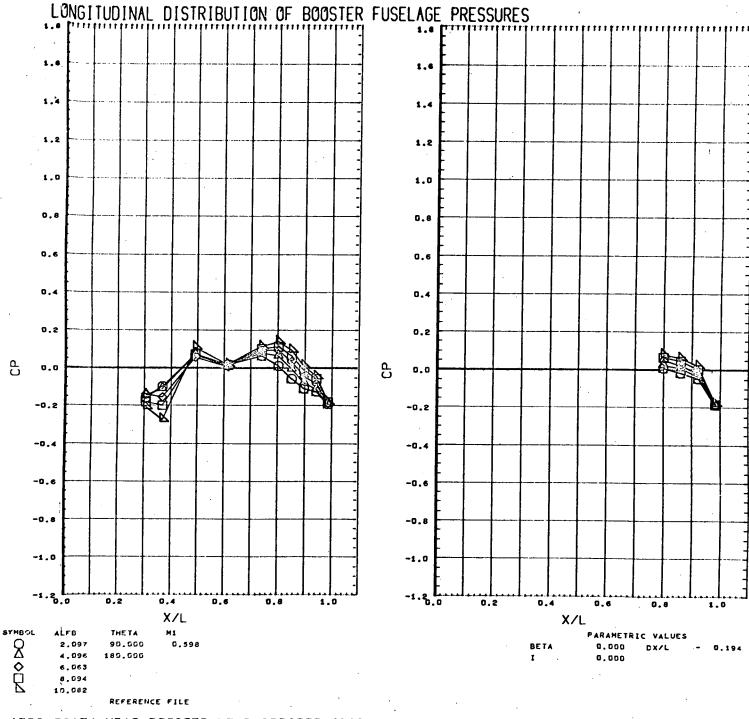
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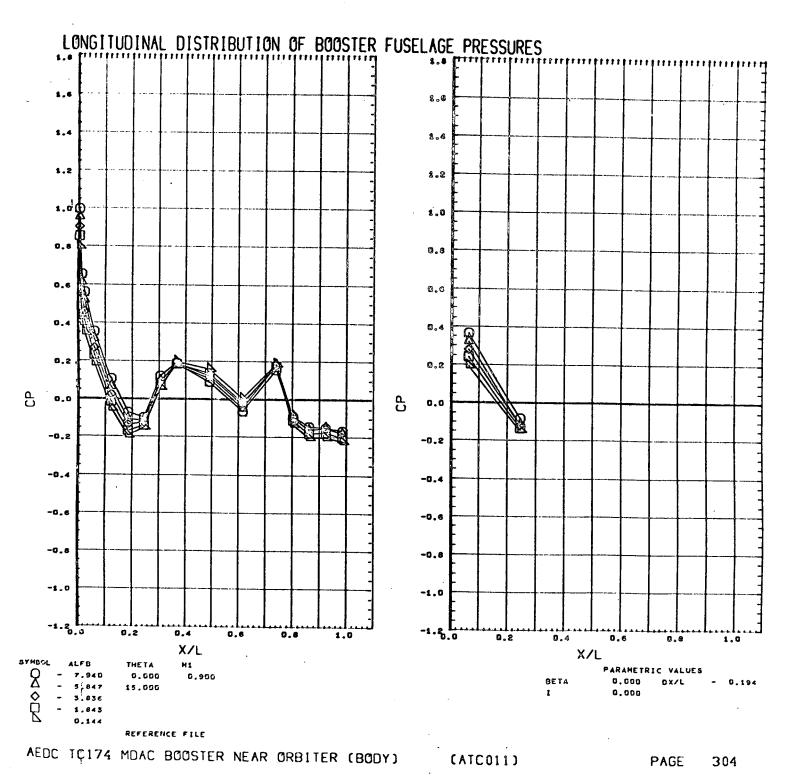


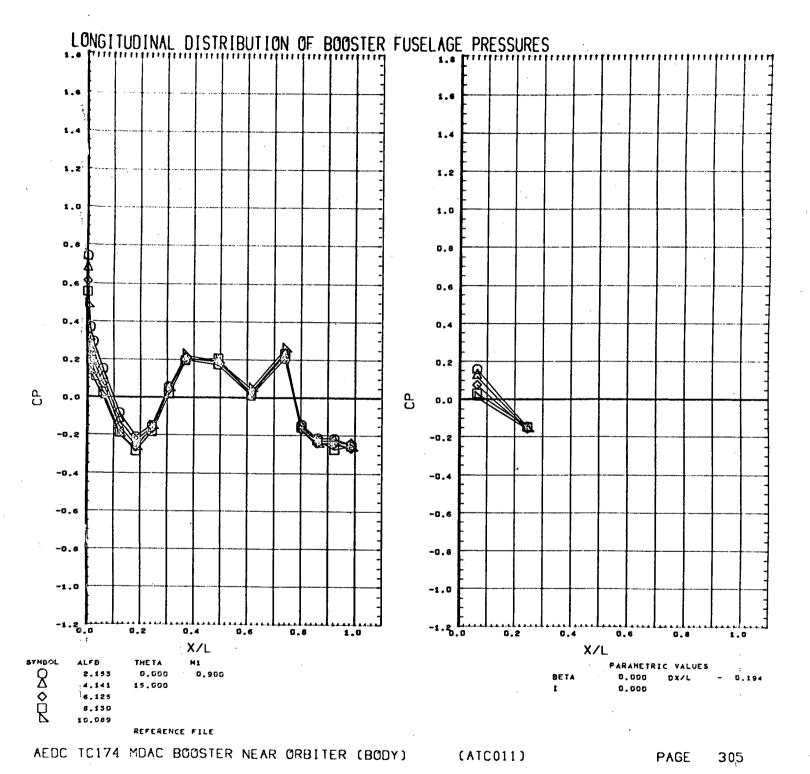


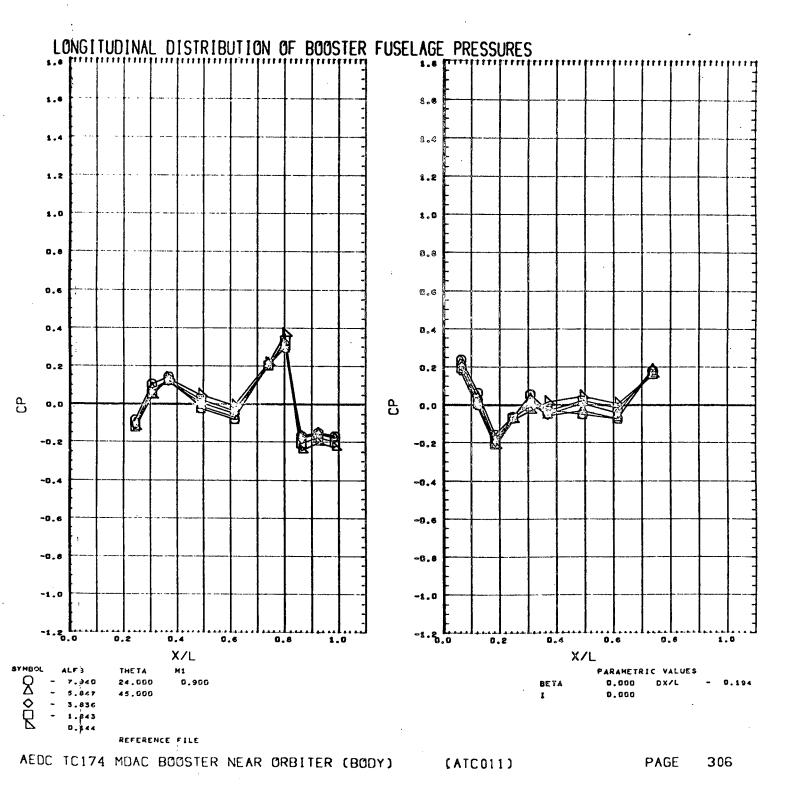


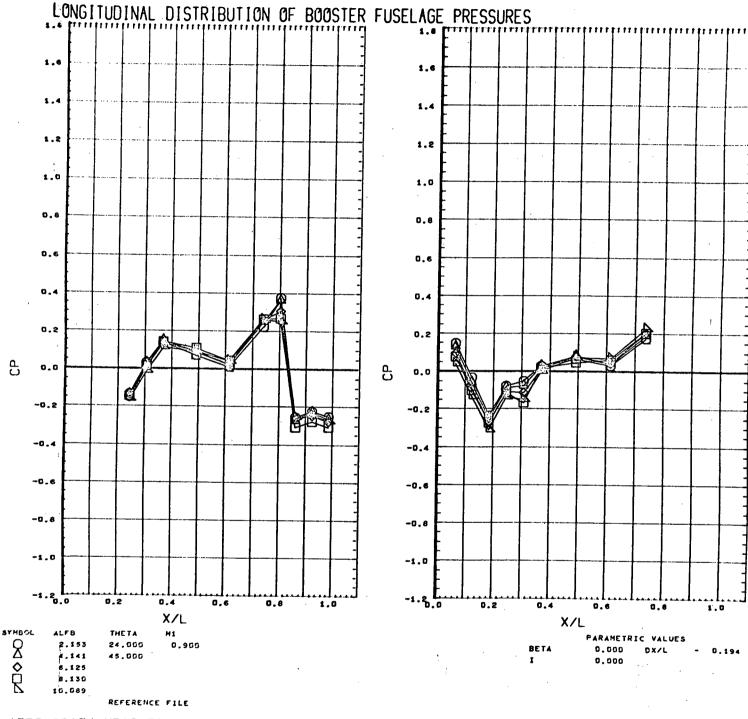
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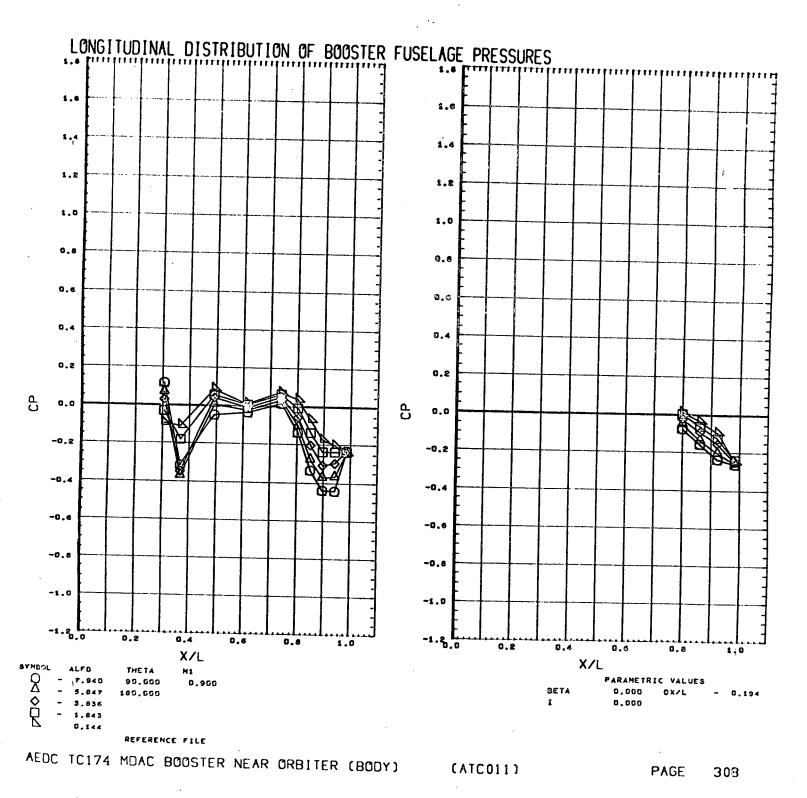


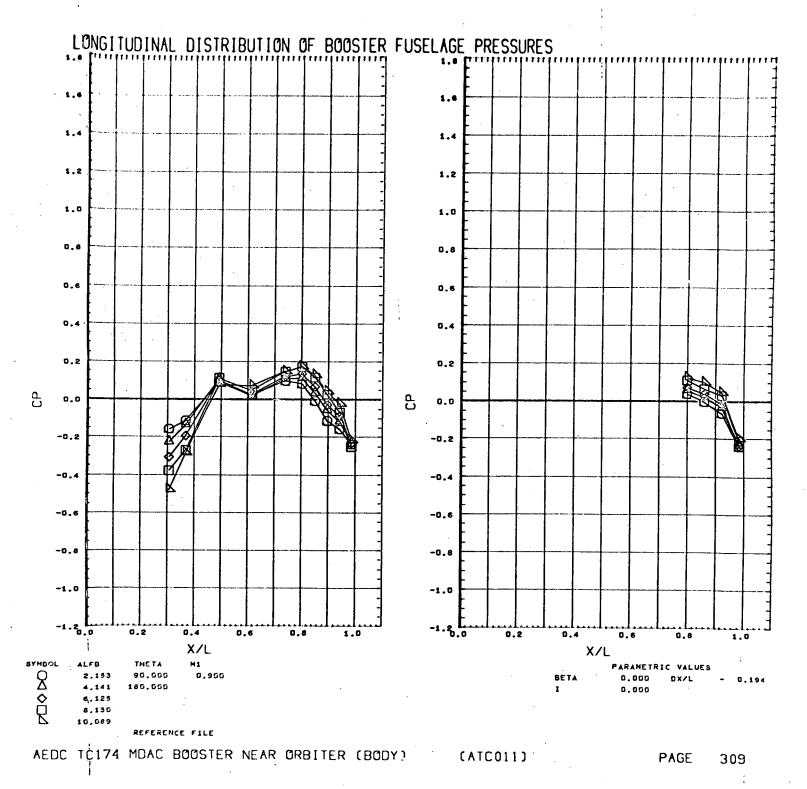


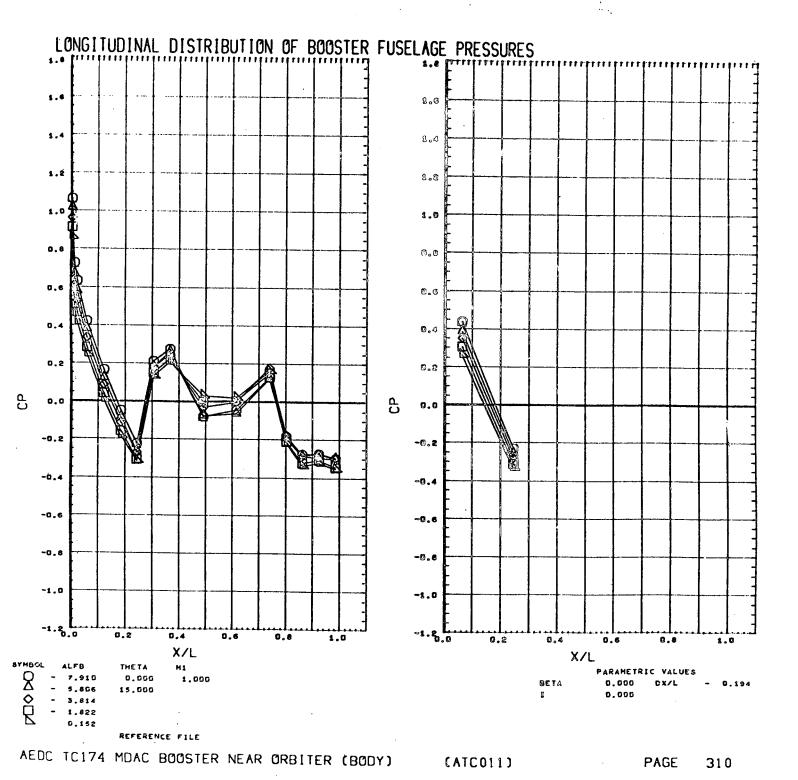


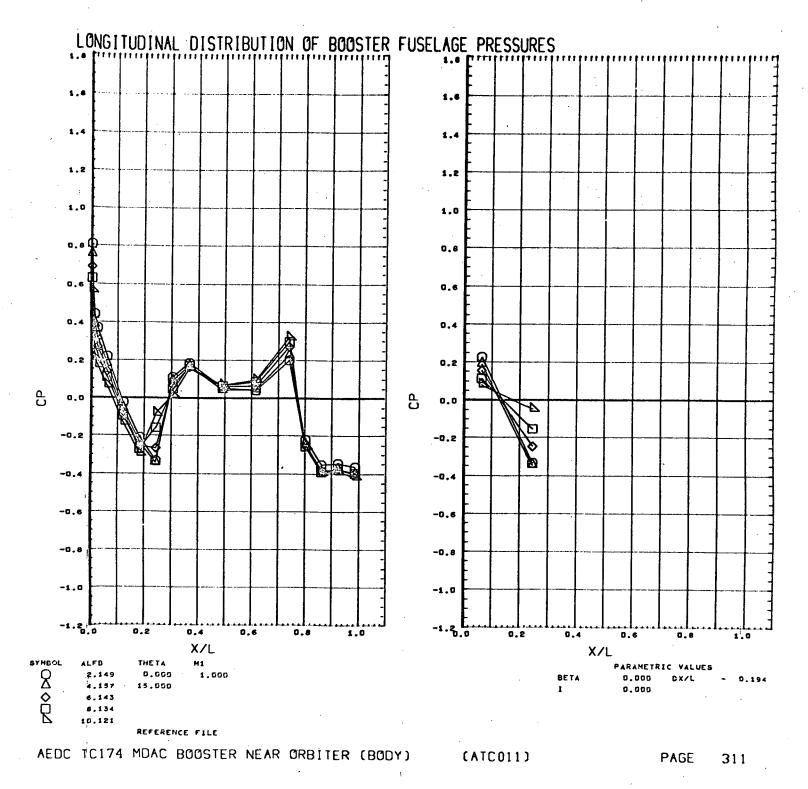


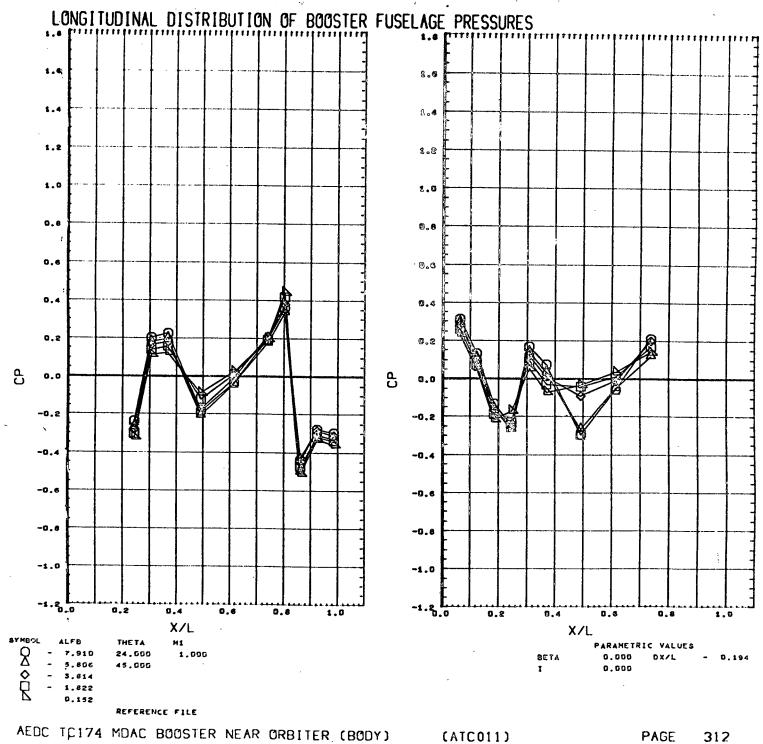
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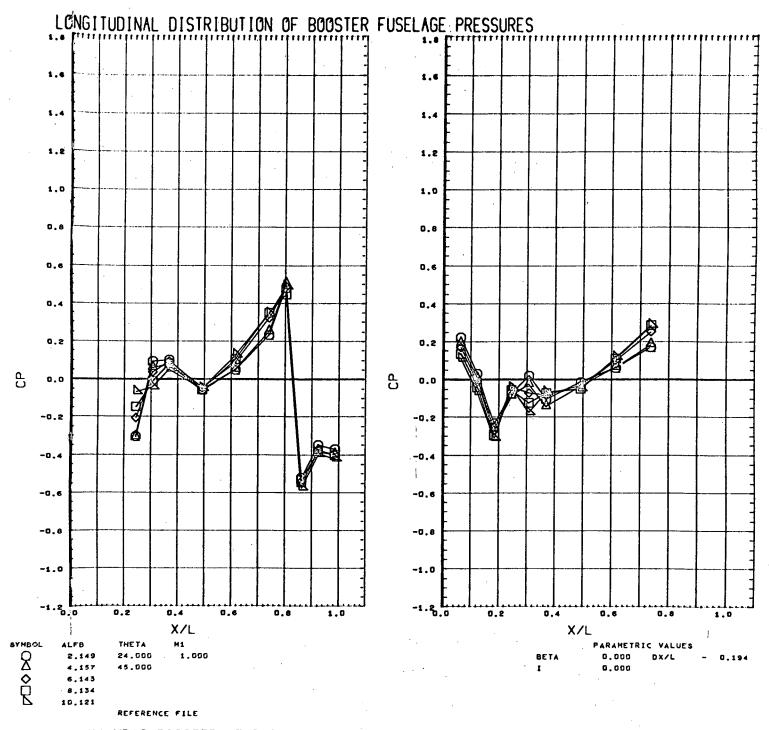




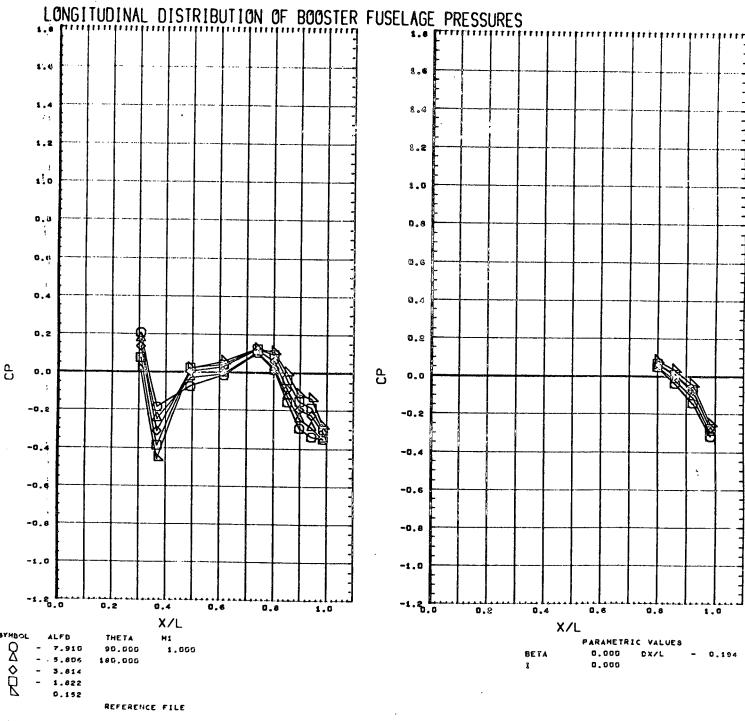


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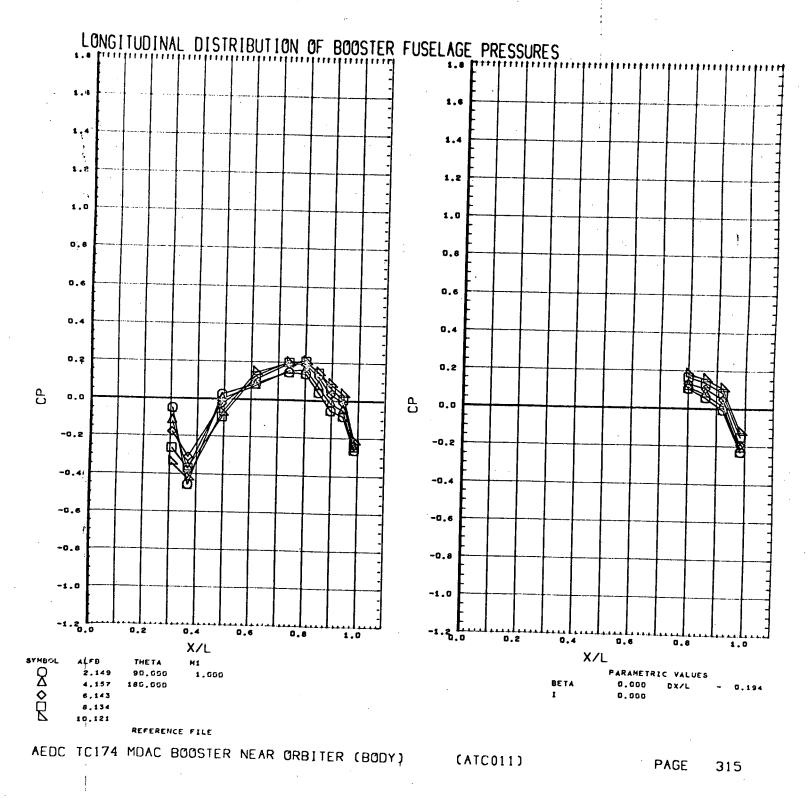
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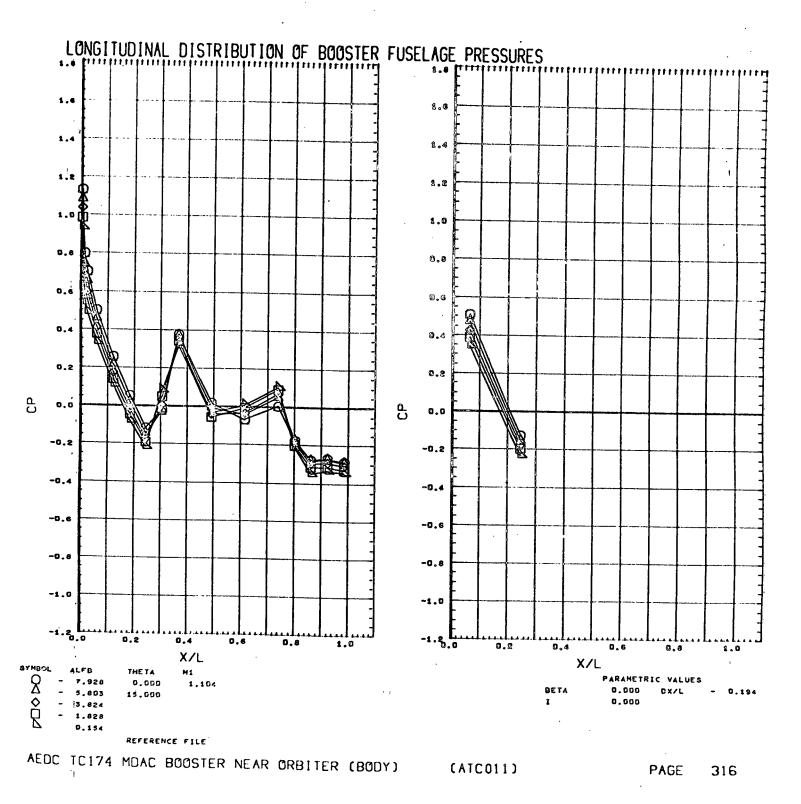


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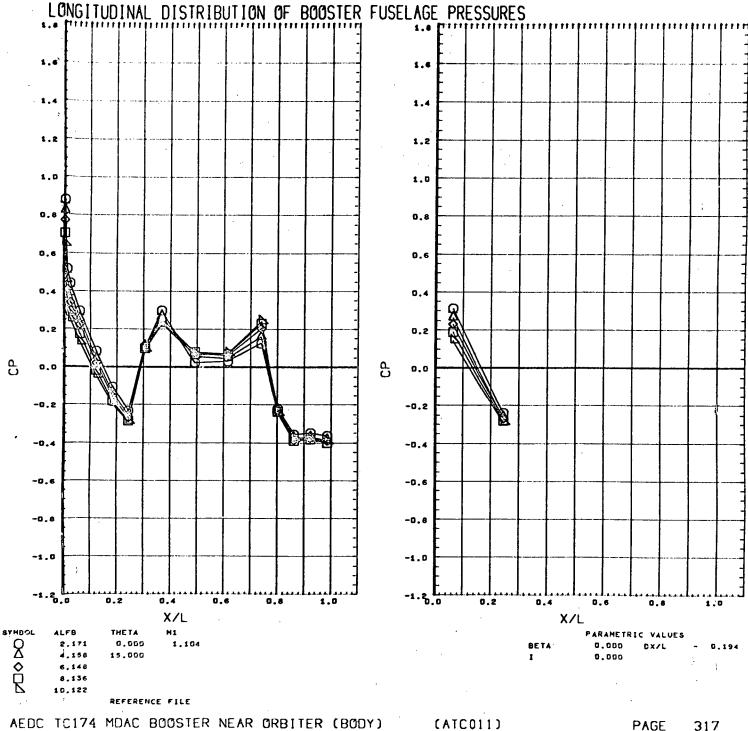


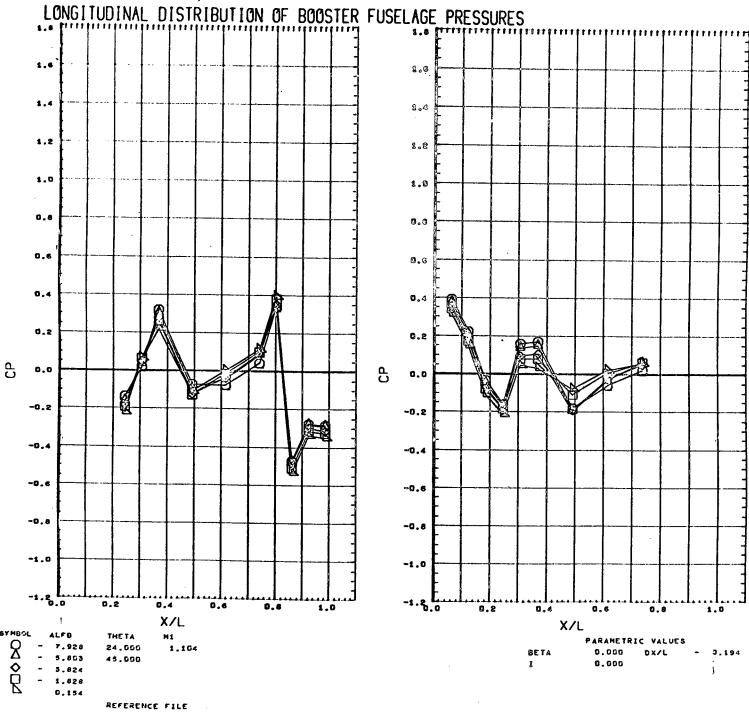
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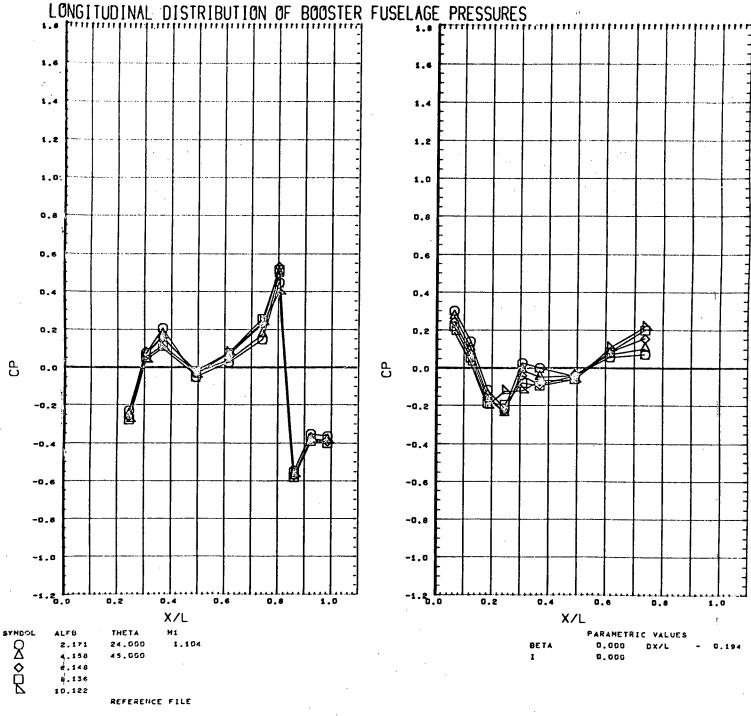


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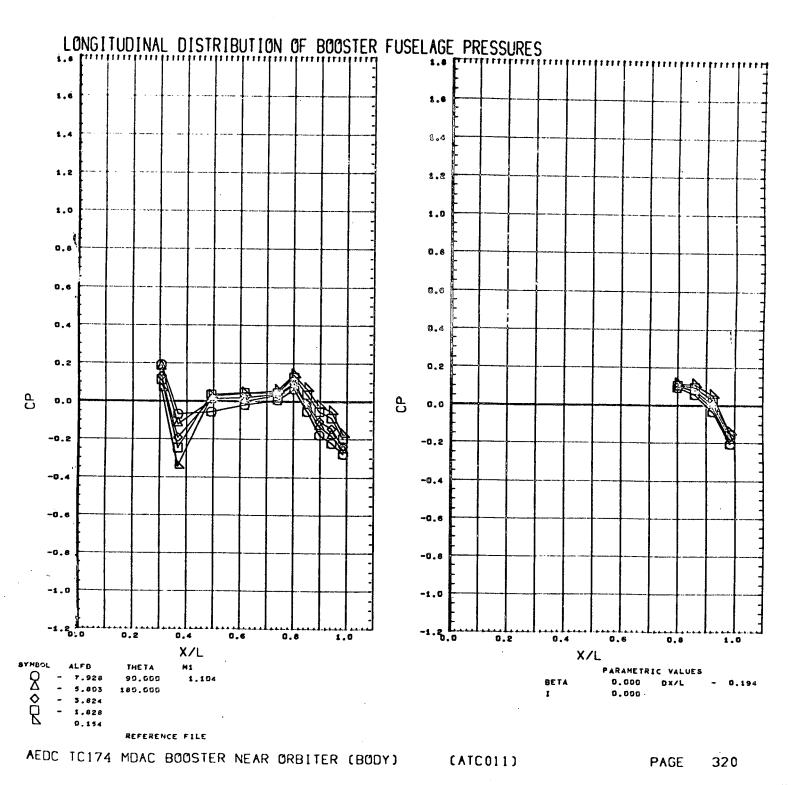


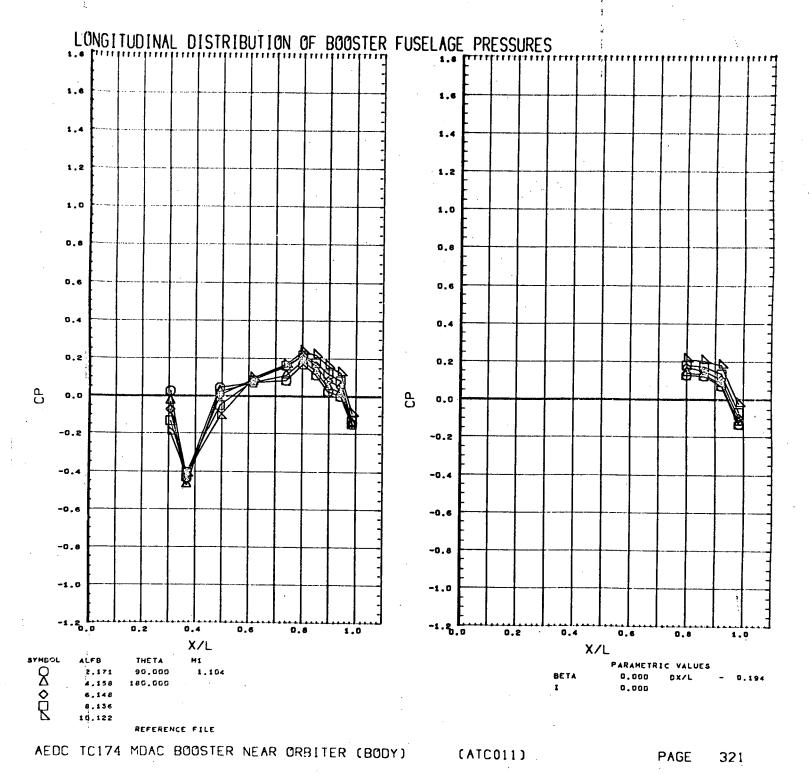


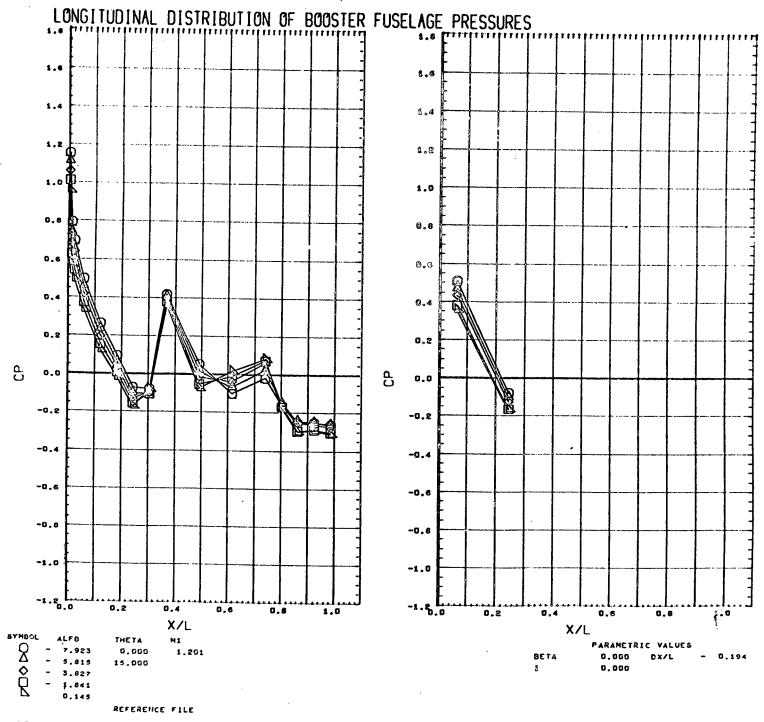
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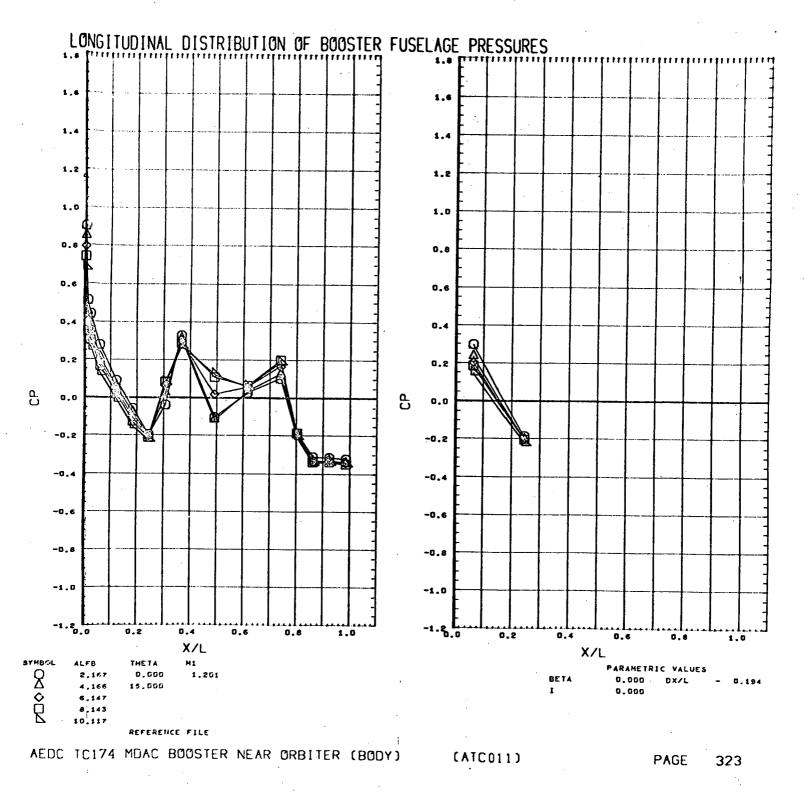


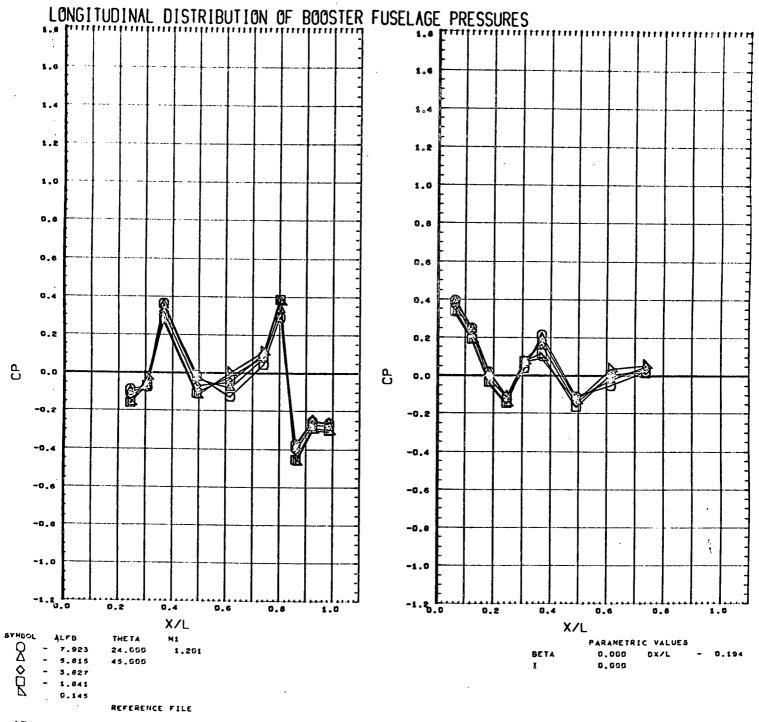




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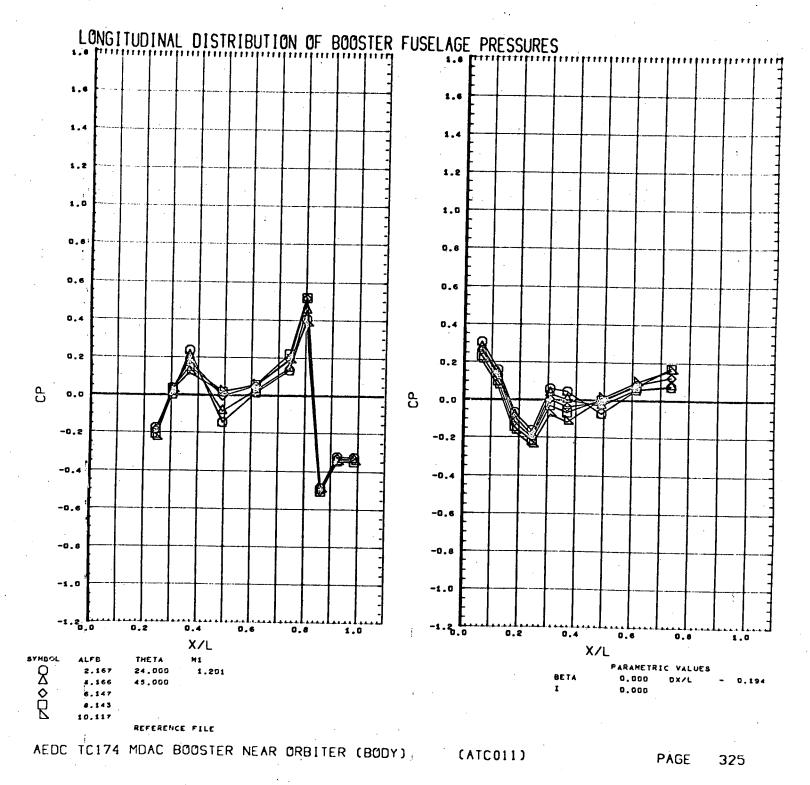
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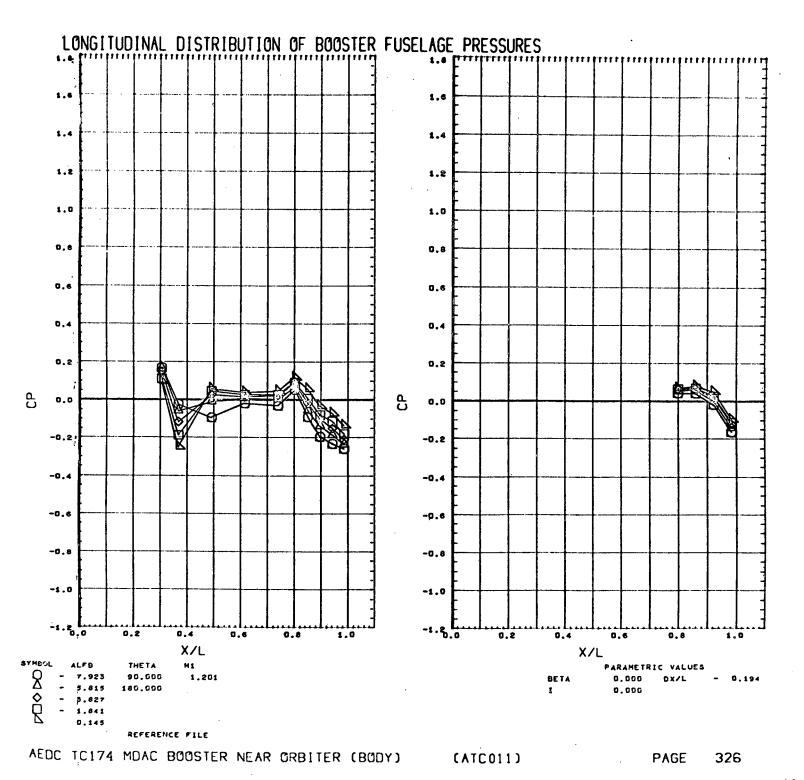


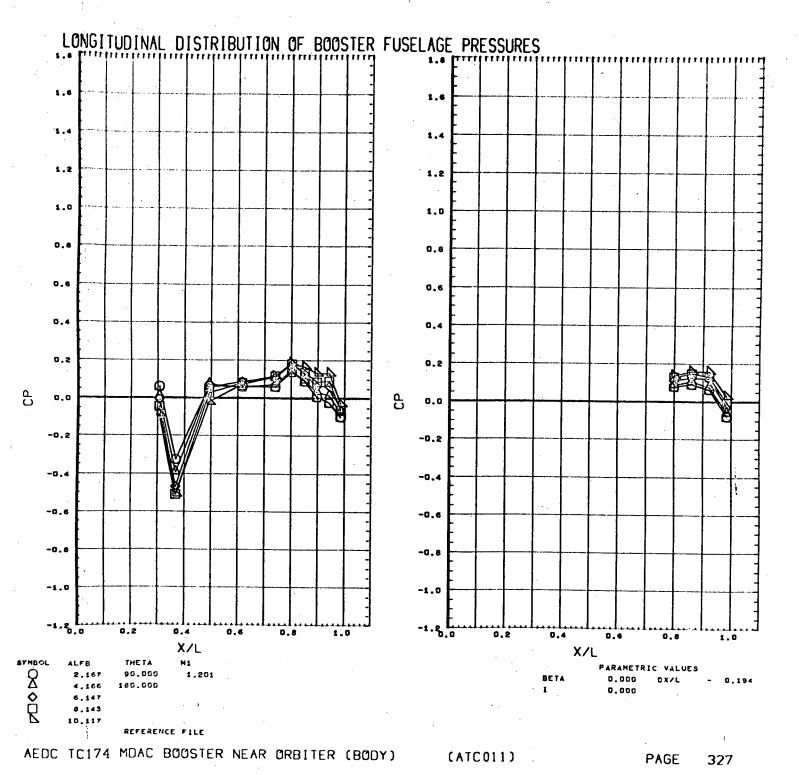


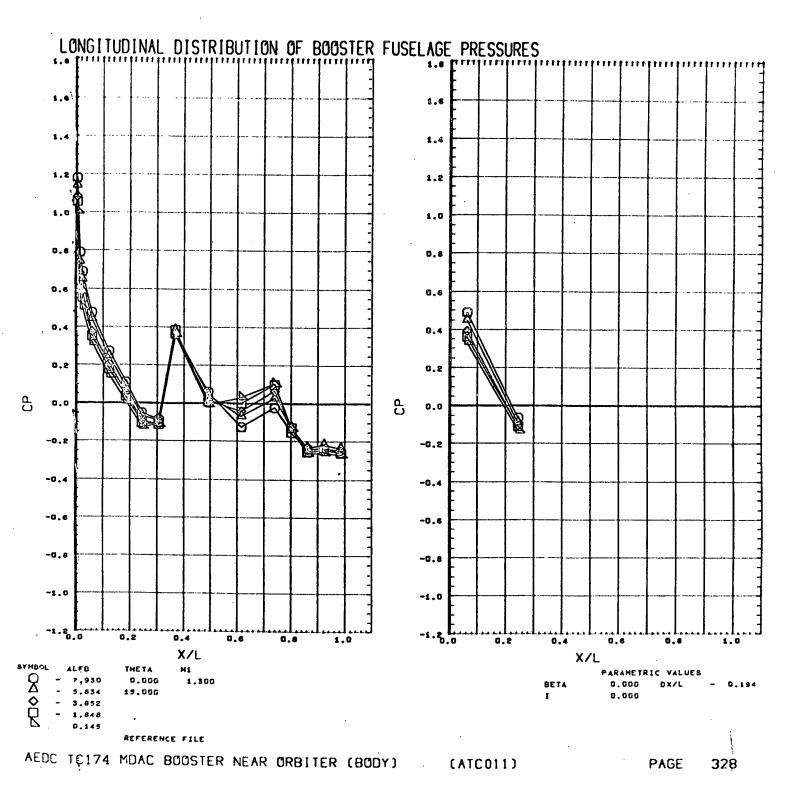
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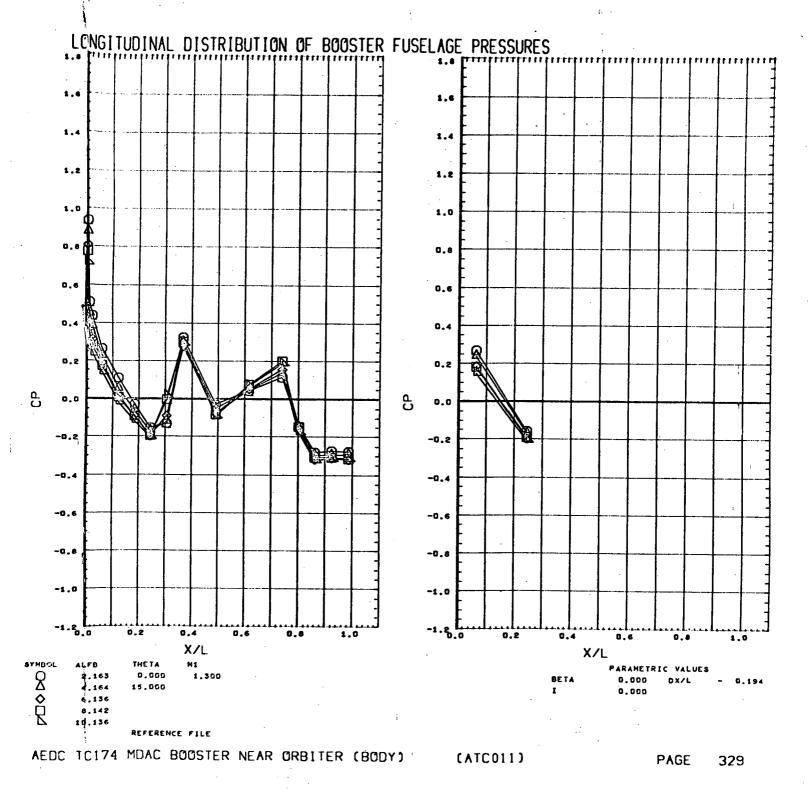
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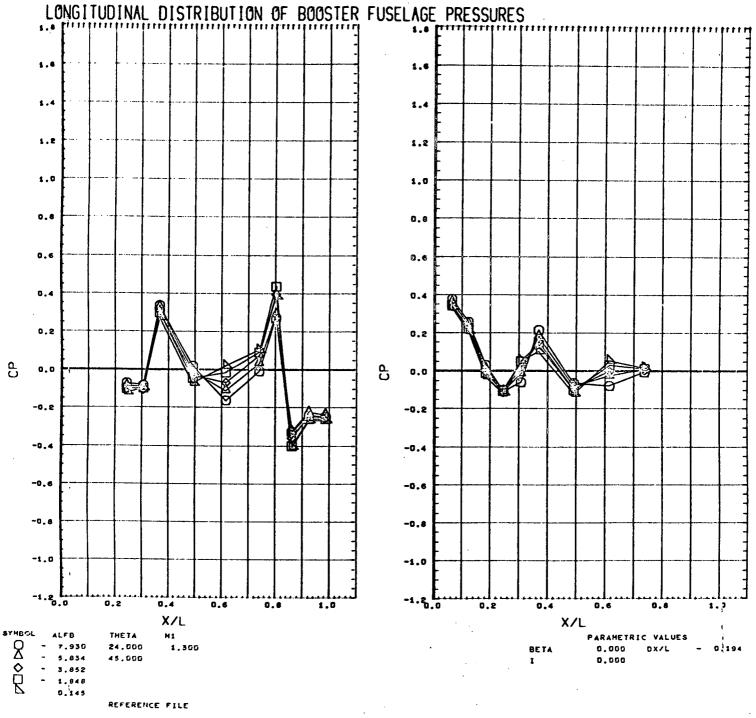








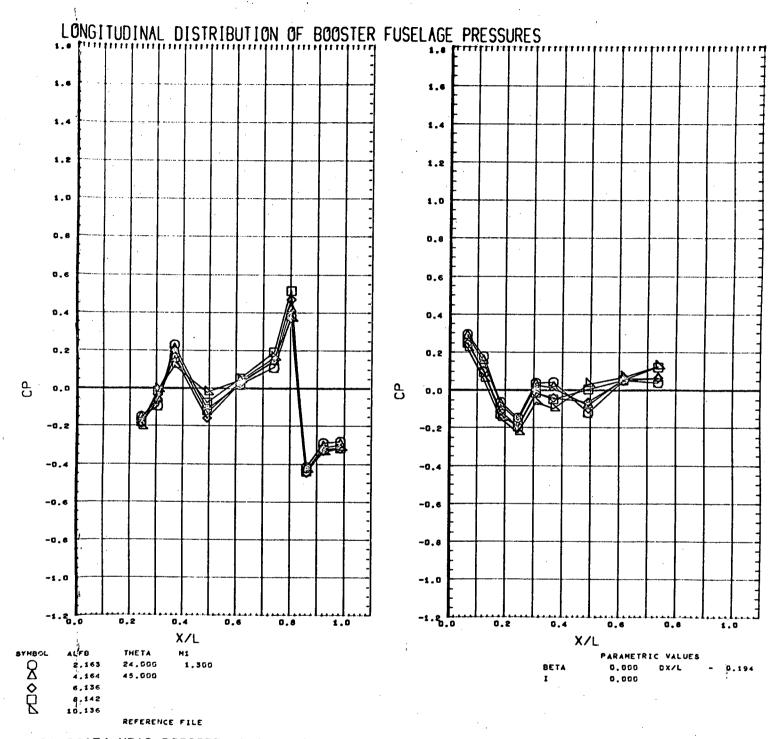




AEDC TC174 MDAC BOOSTER NEAR ORBITER (BODY)

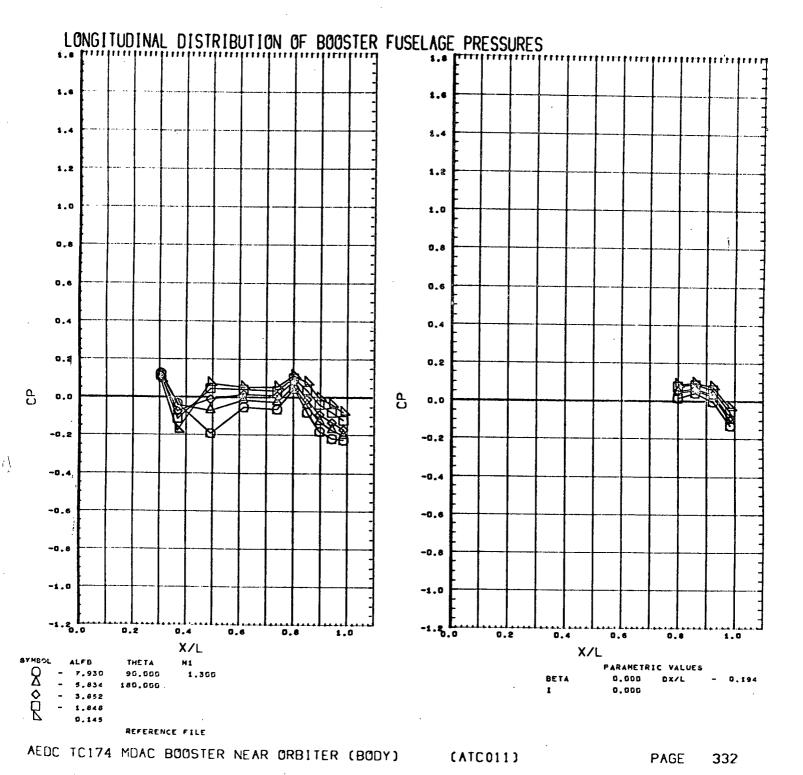
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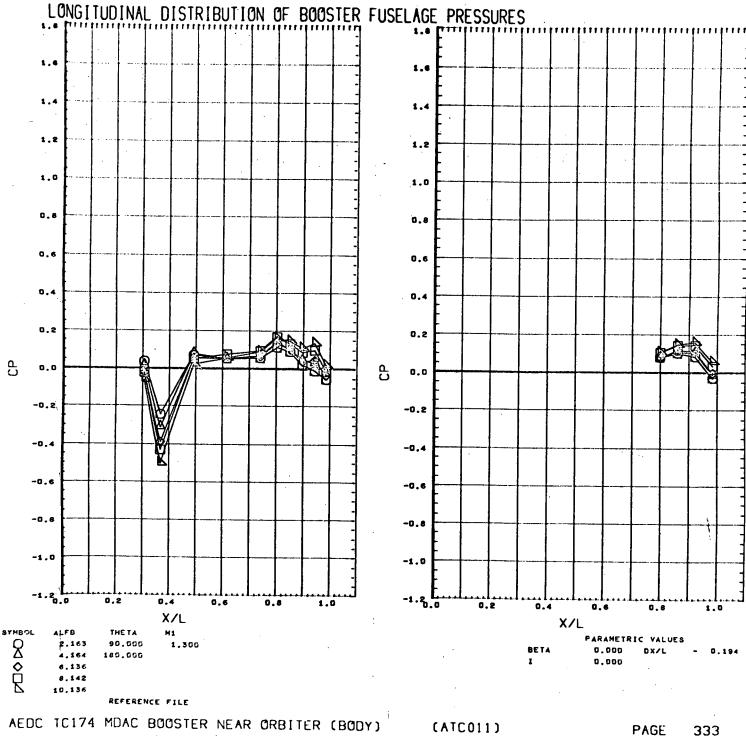
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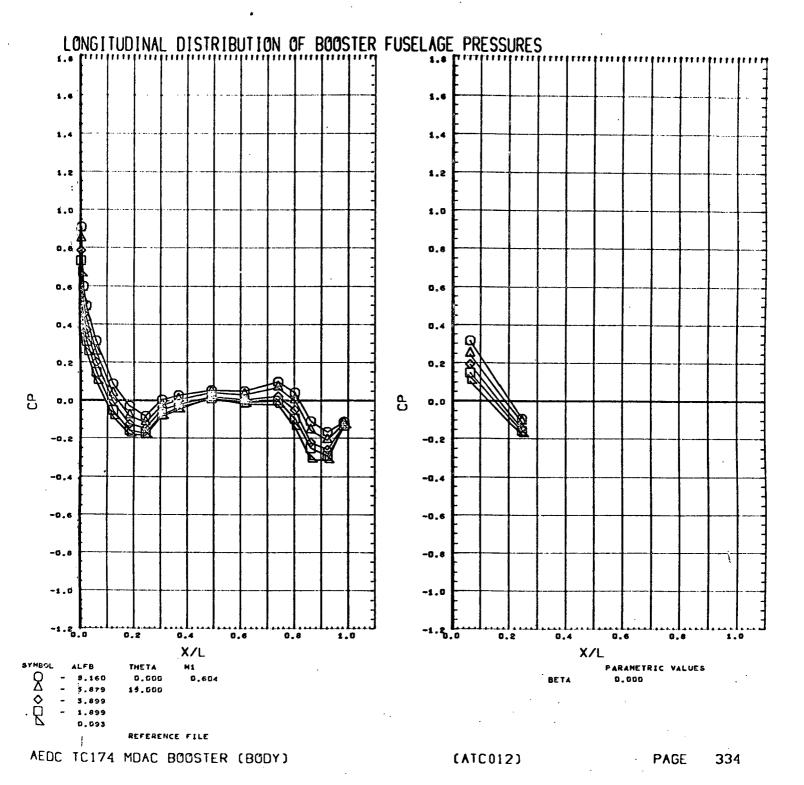


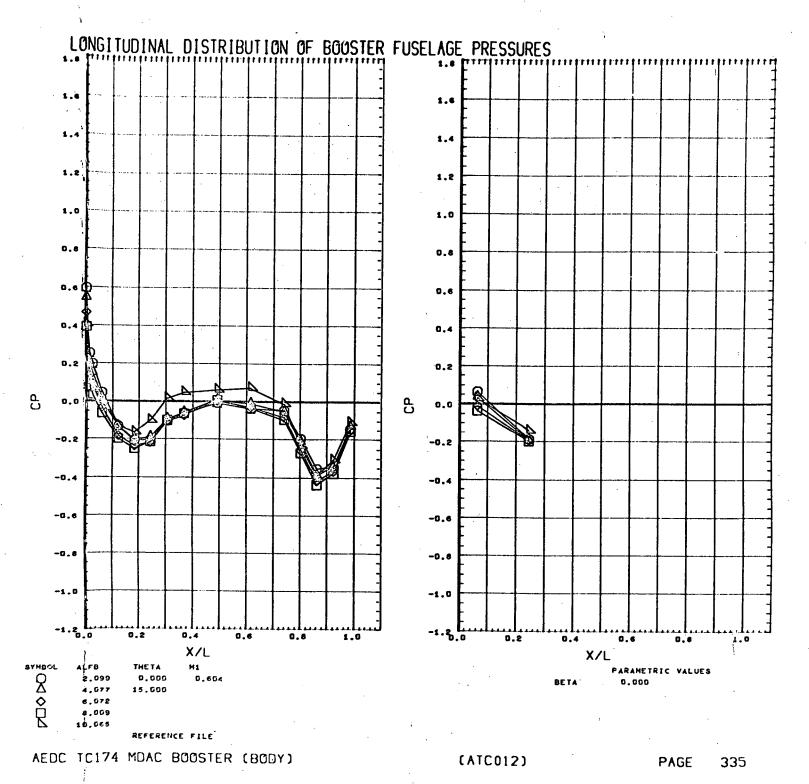
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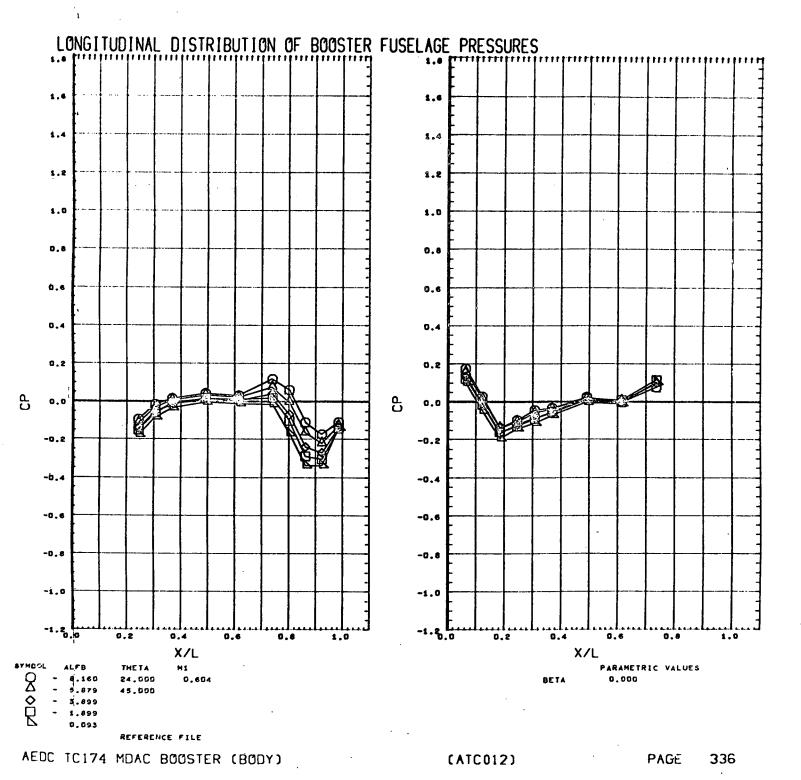
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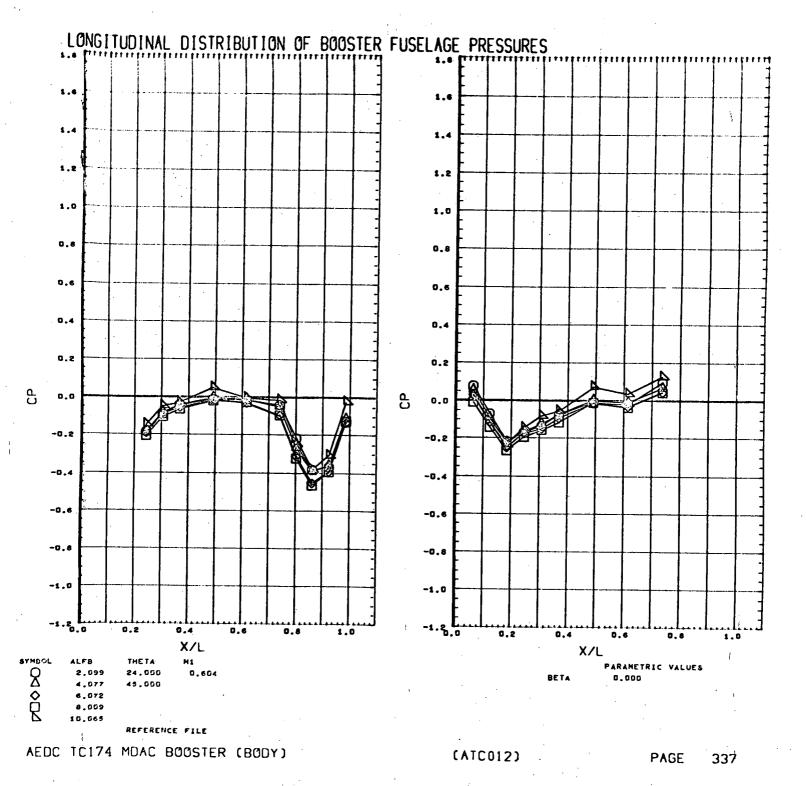


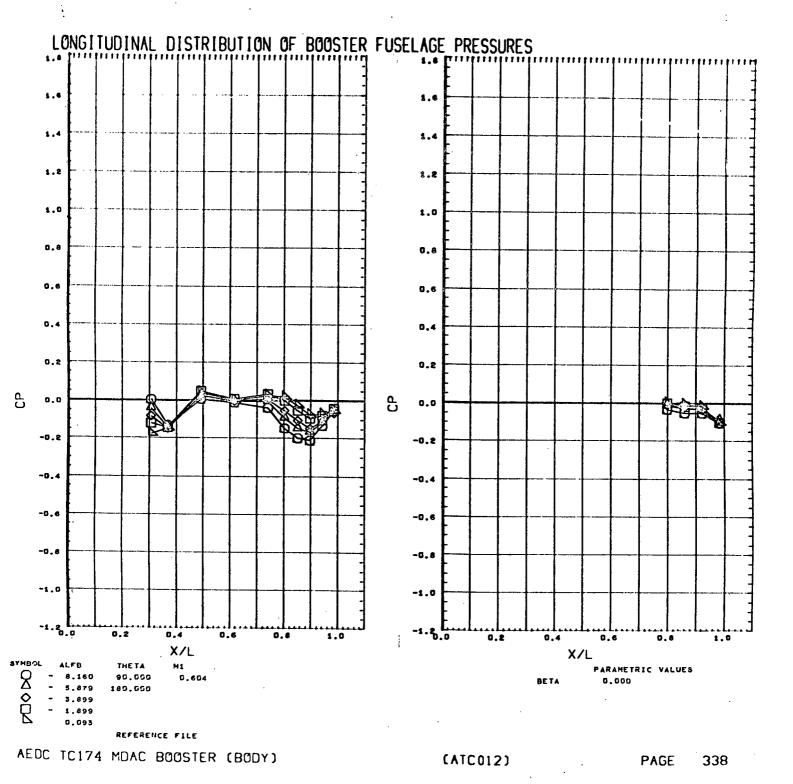


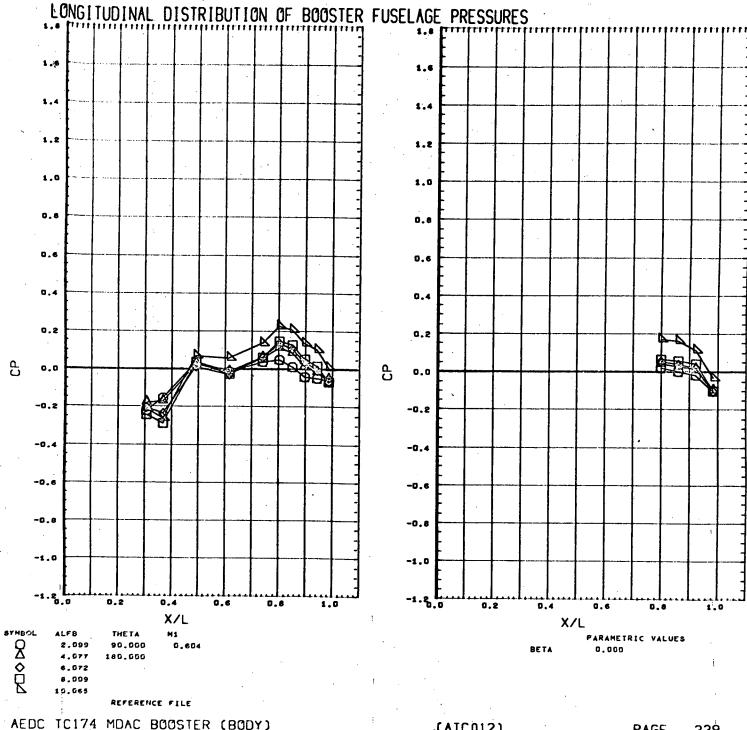


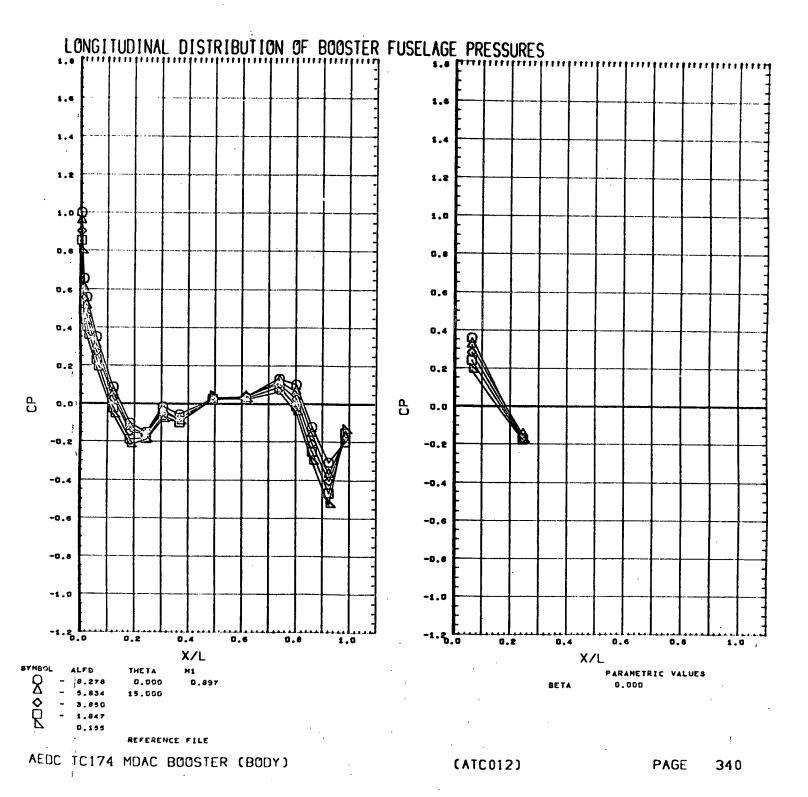


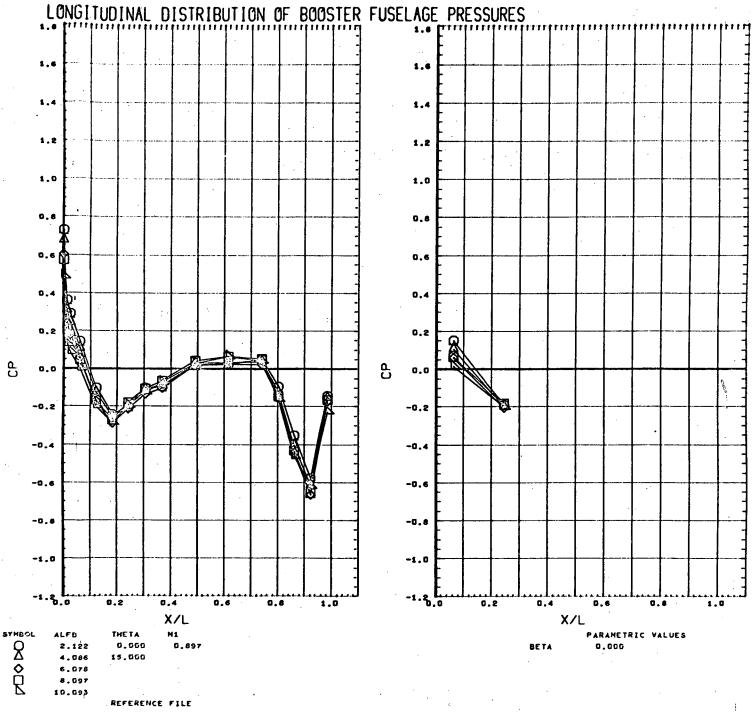




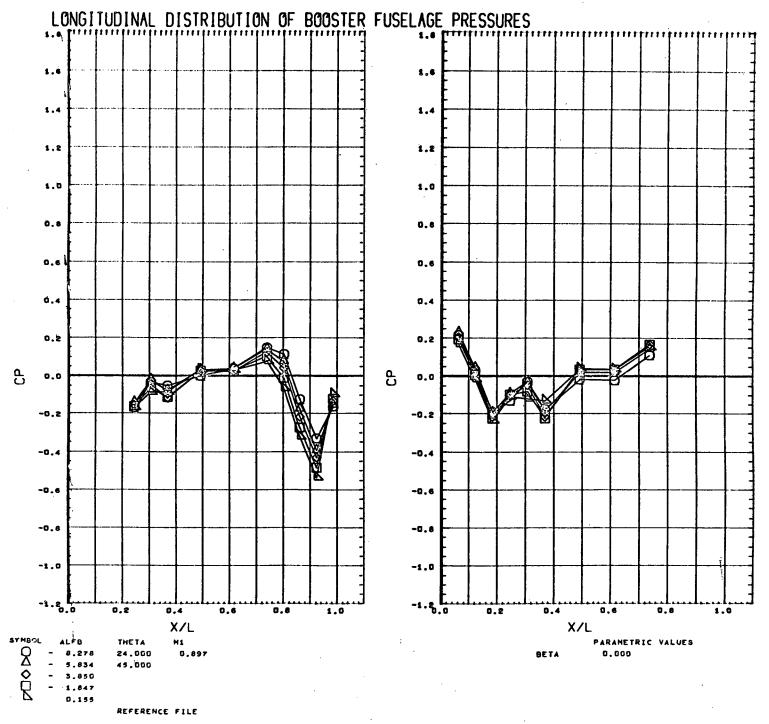






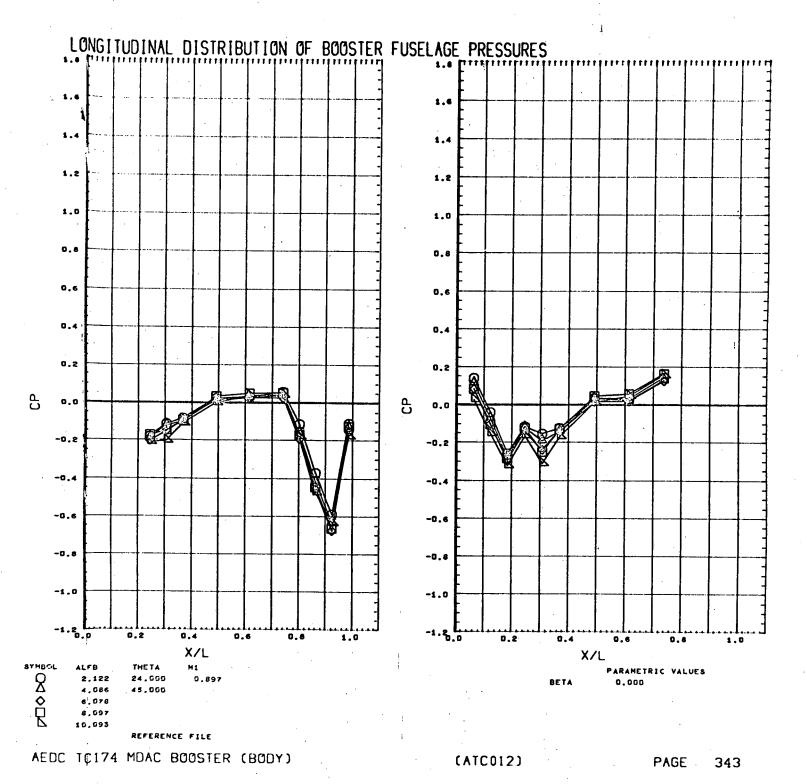


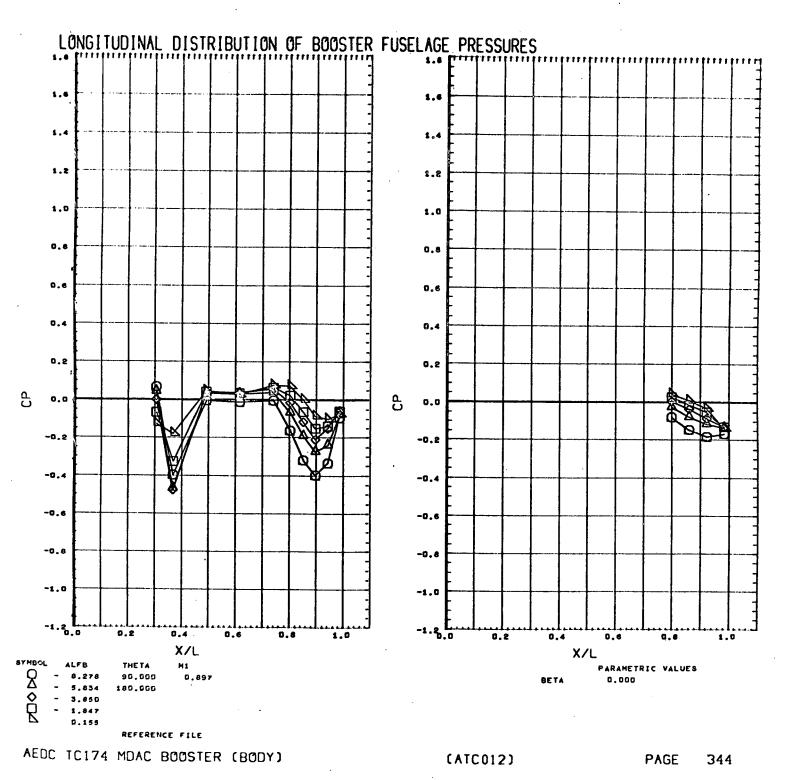
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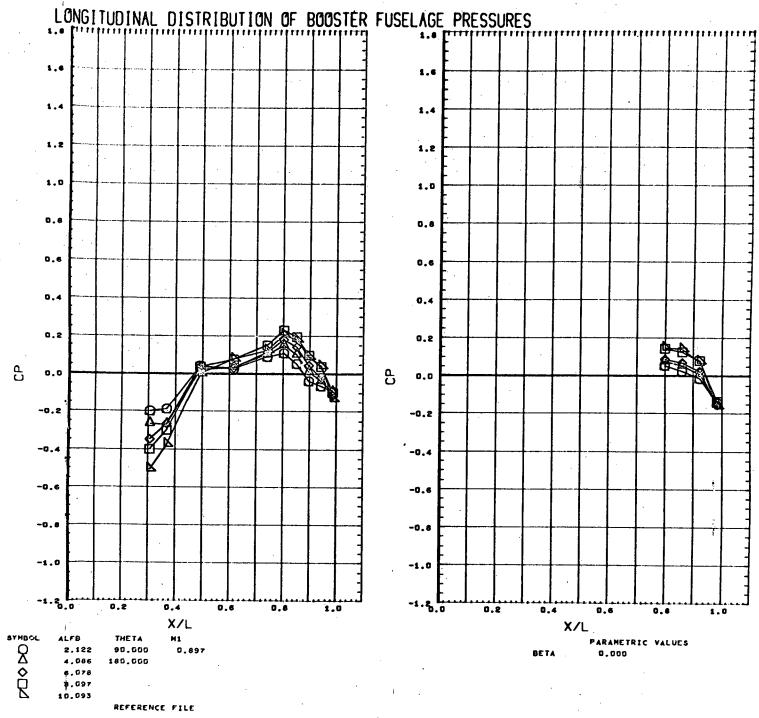


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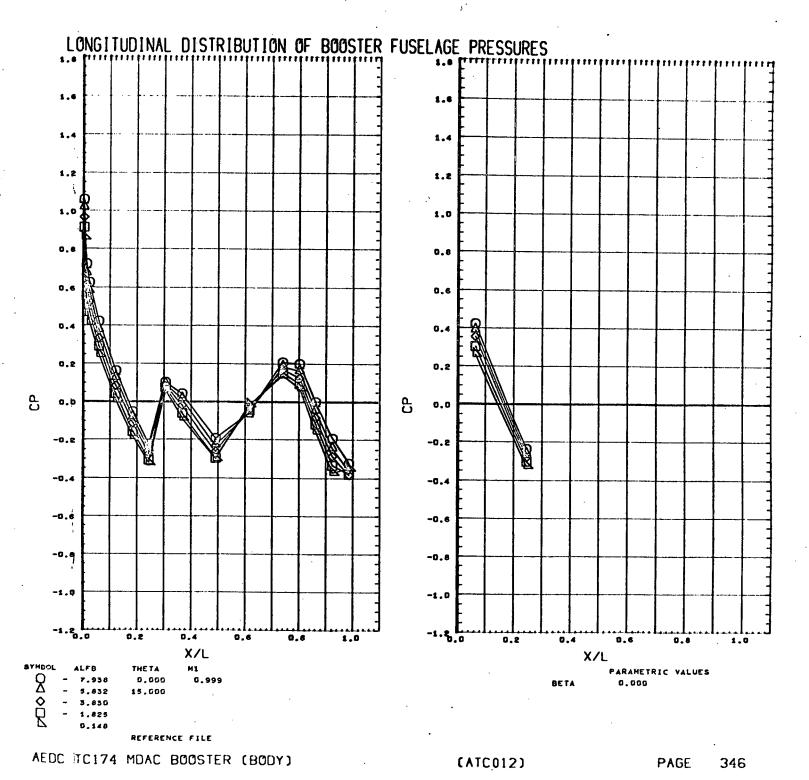
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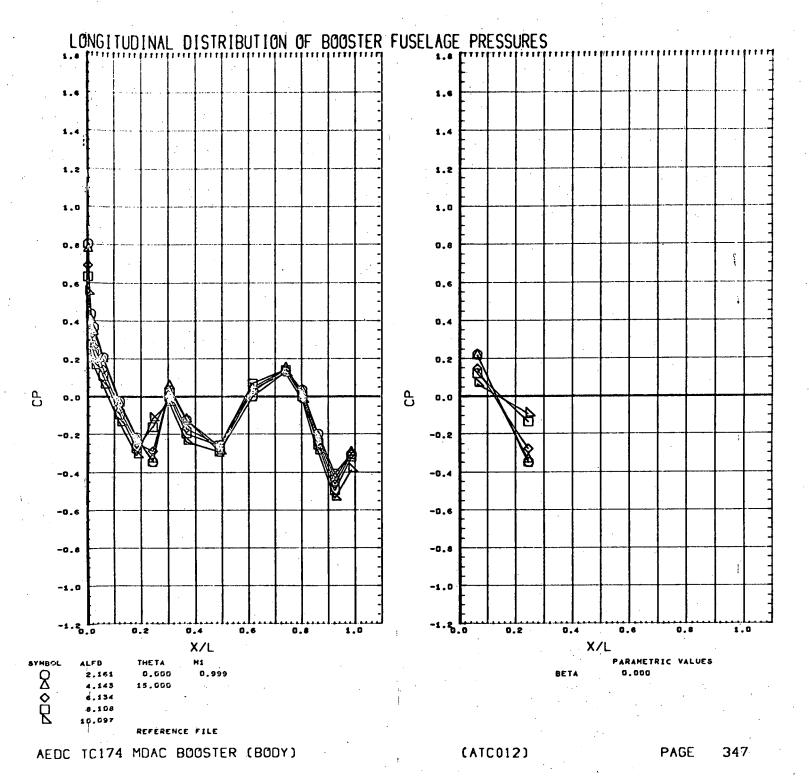


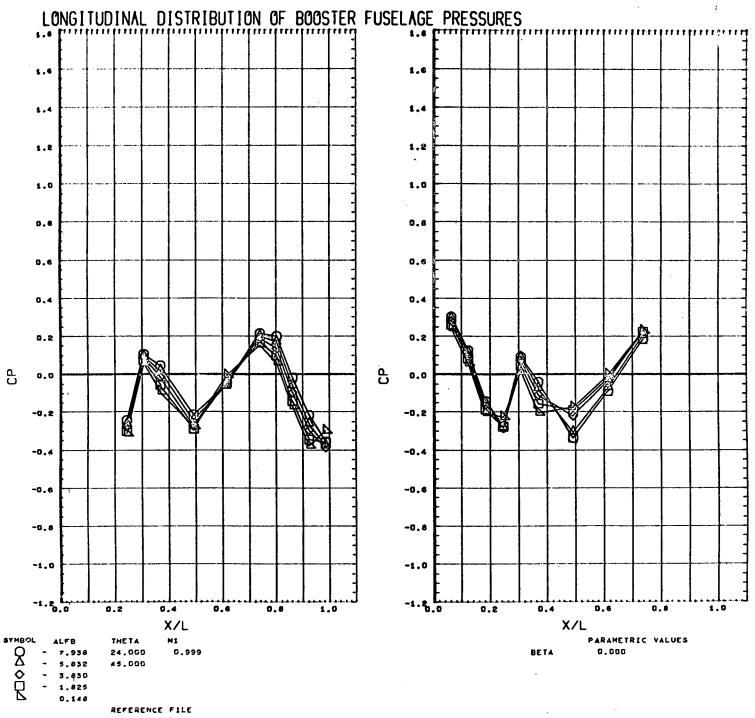




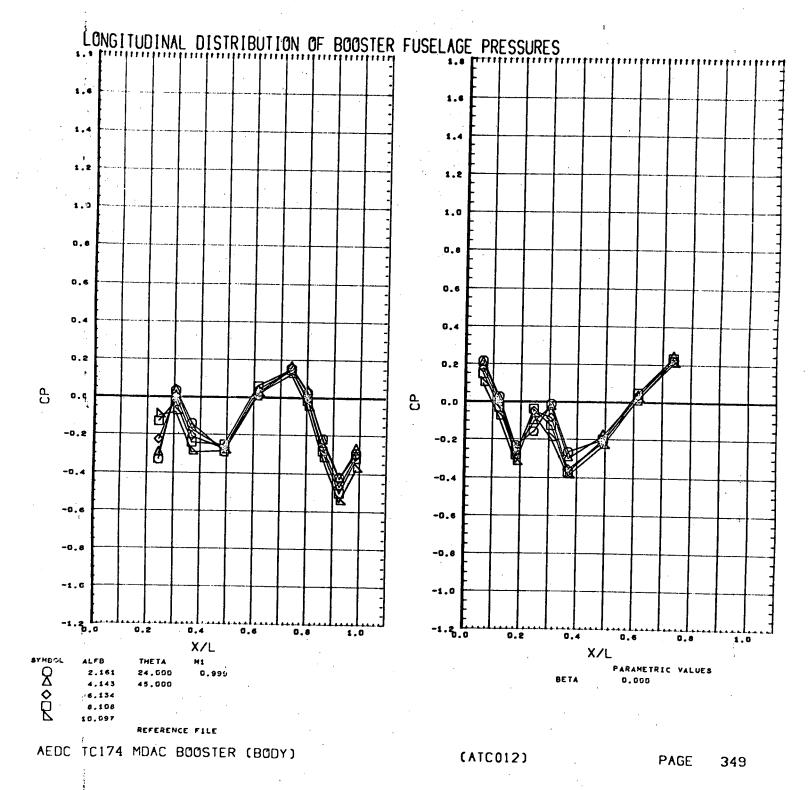
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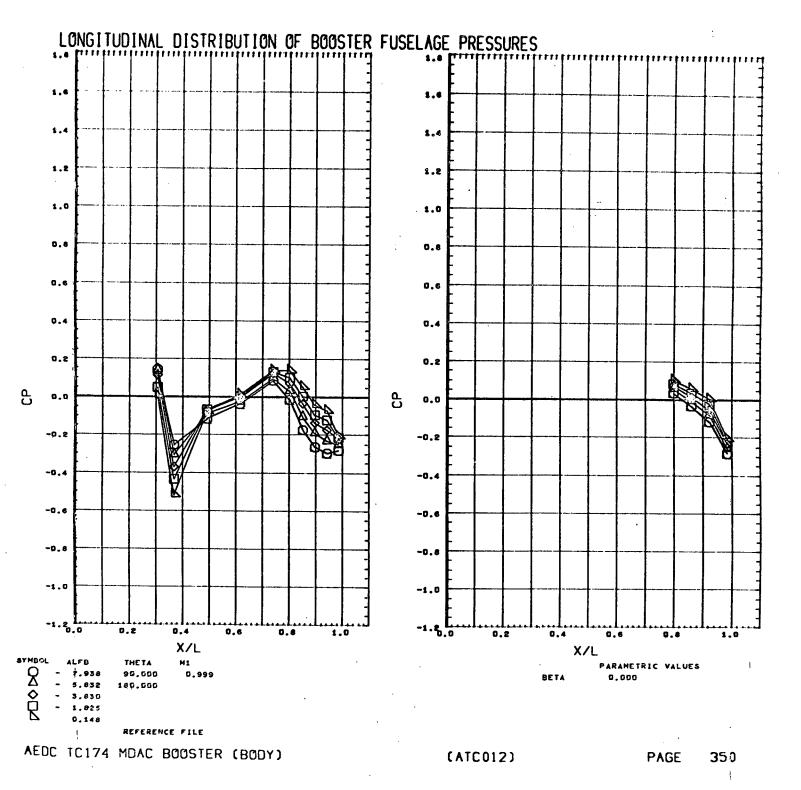


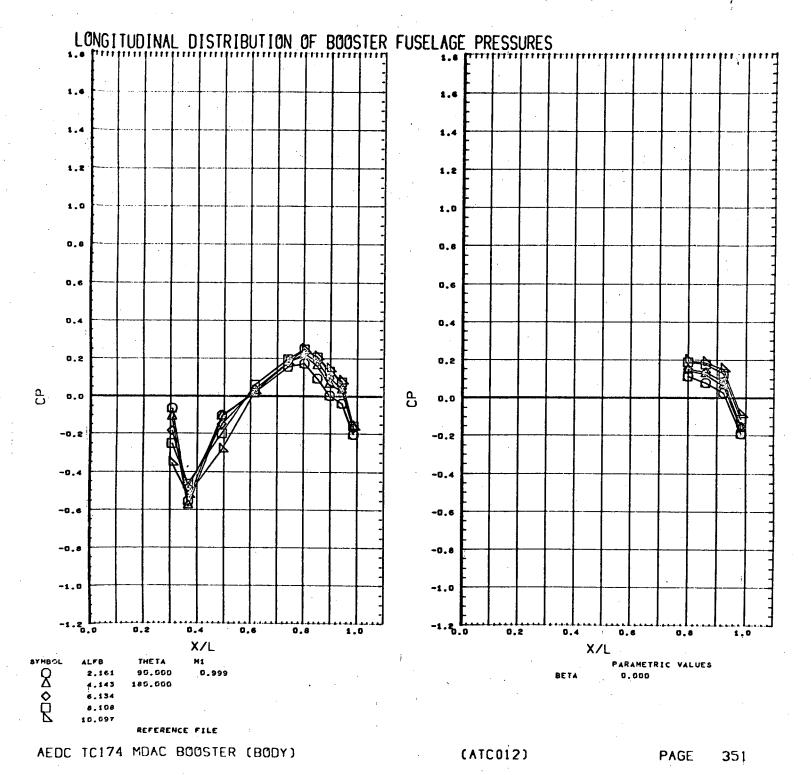


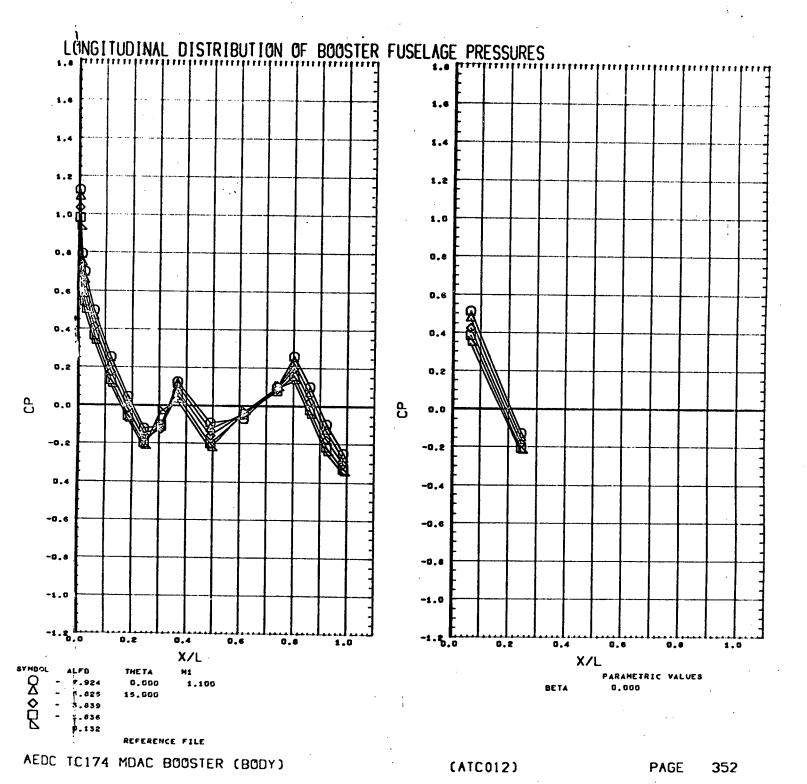


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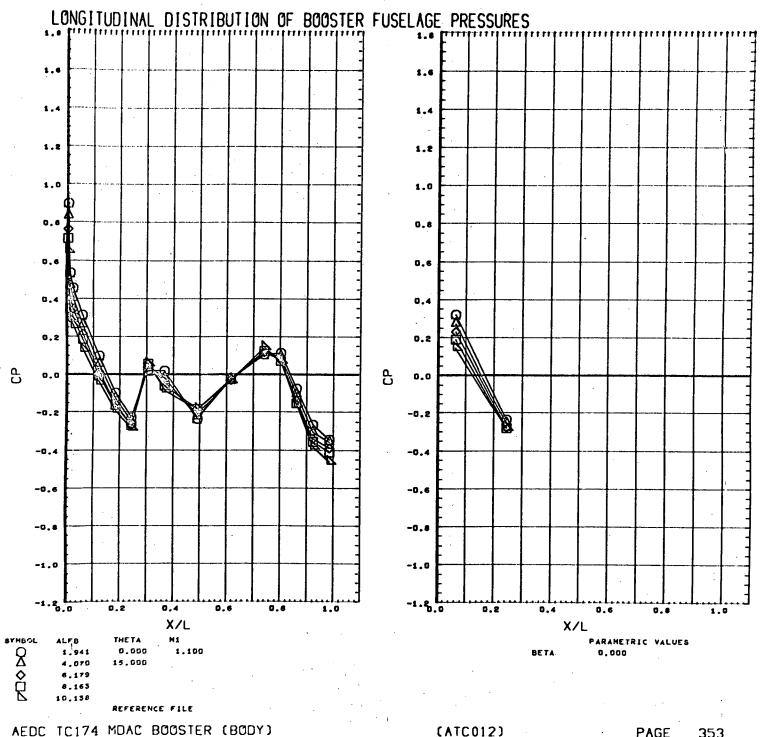




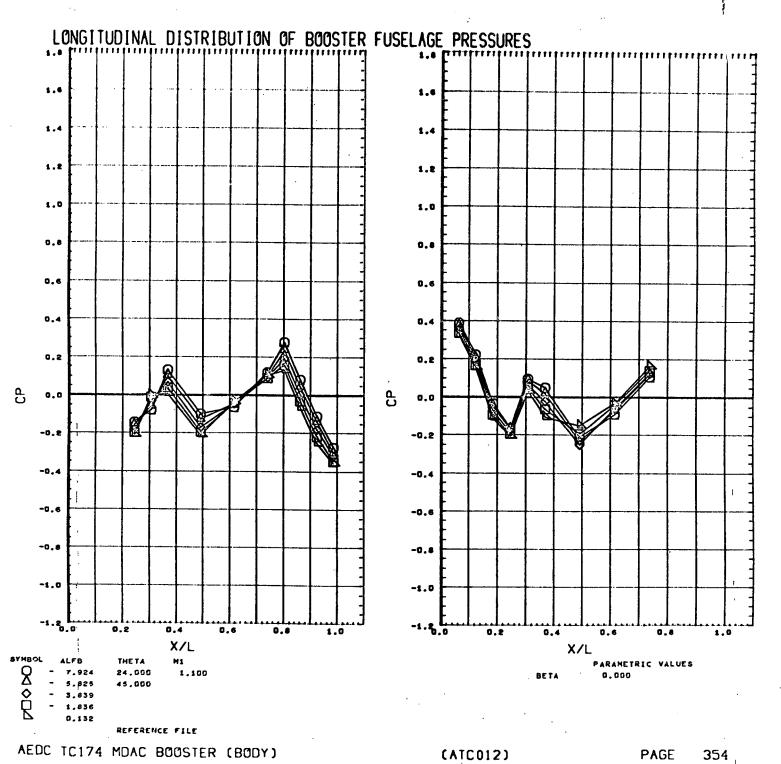


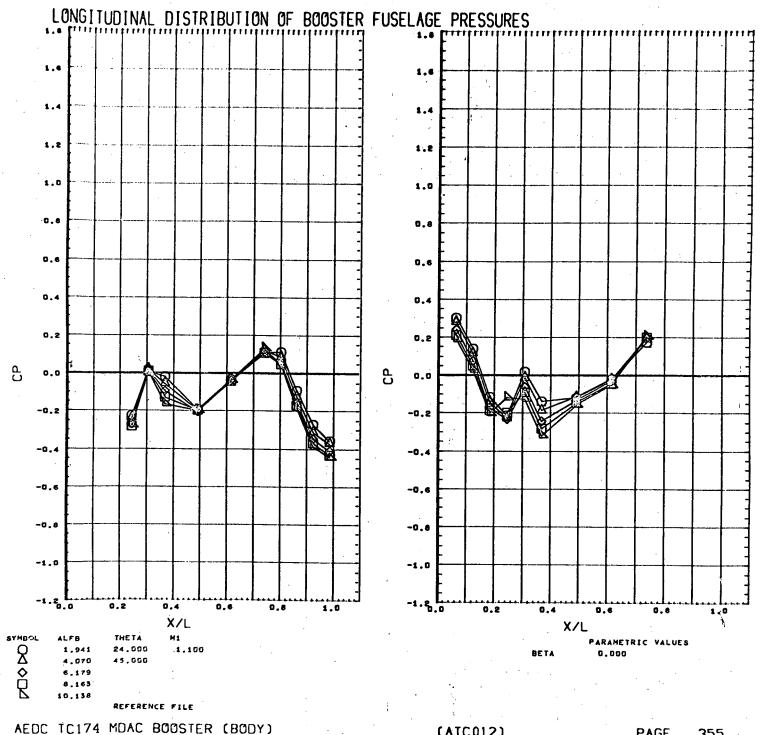


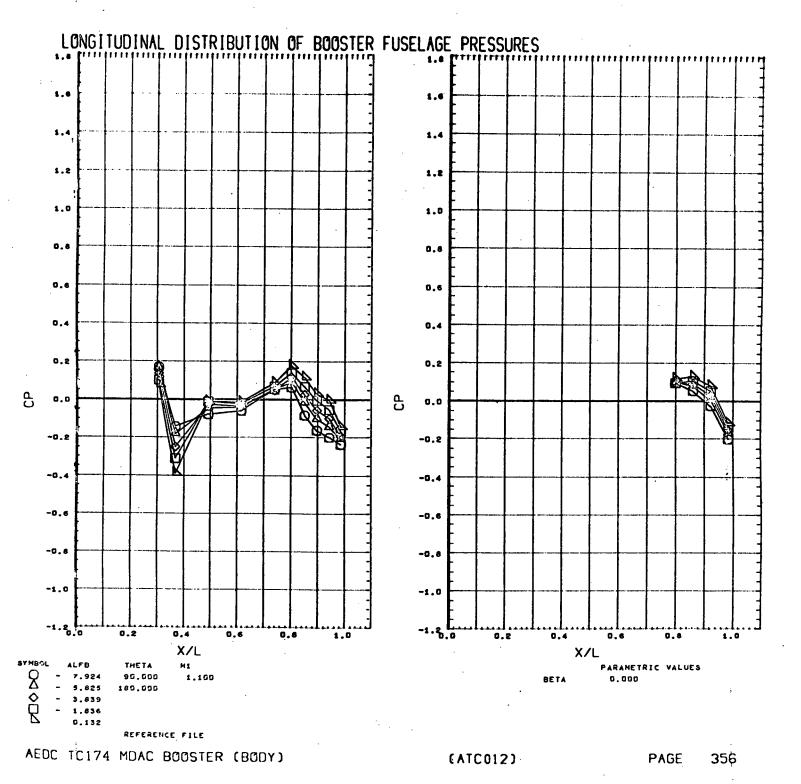
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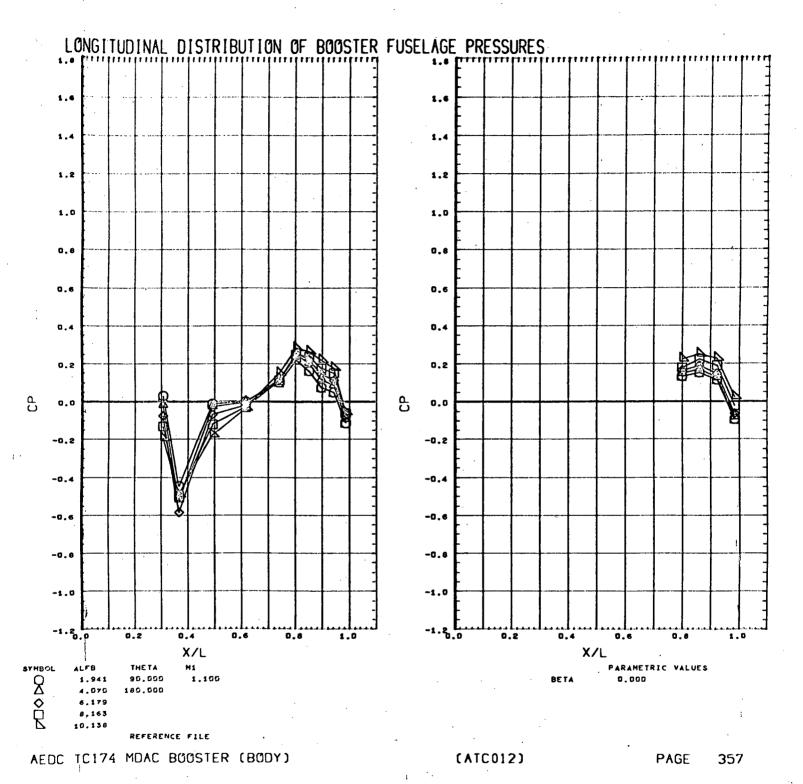


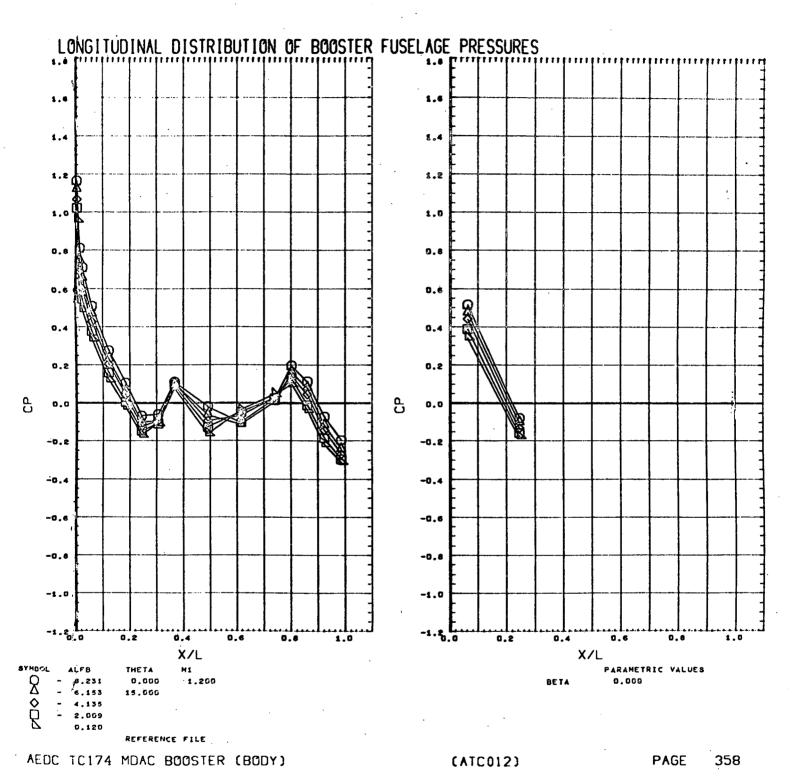
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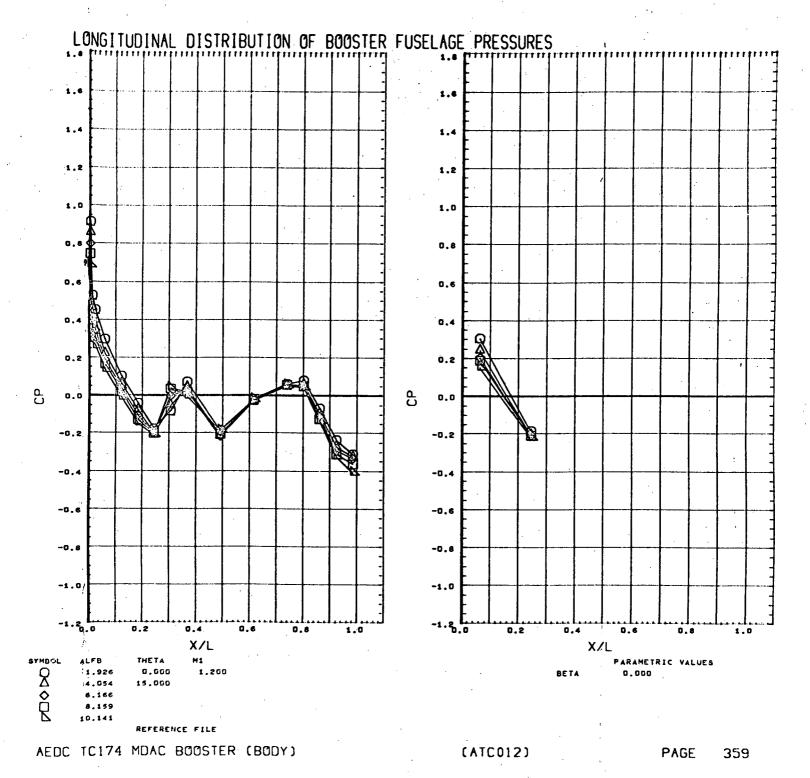


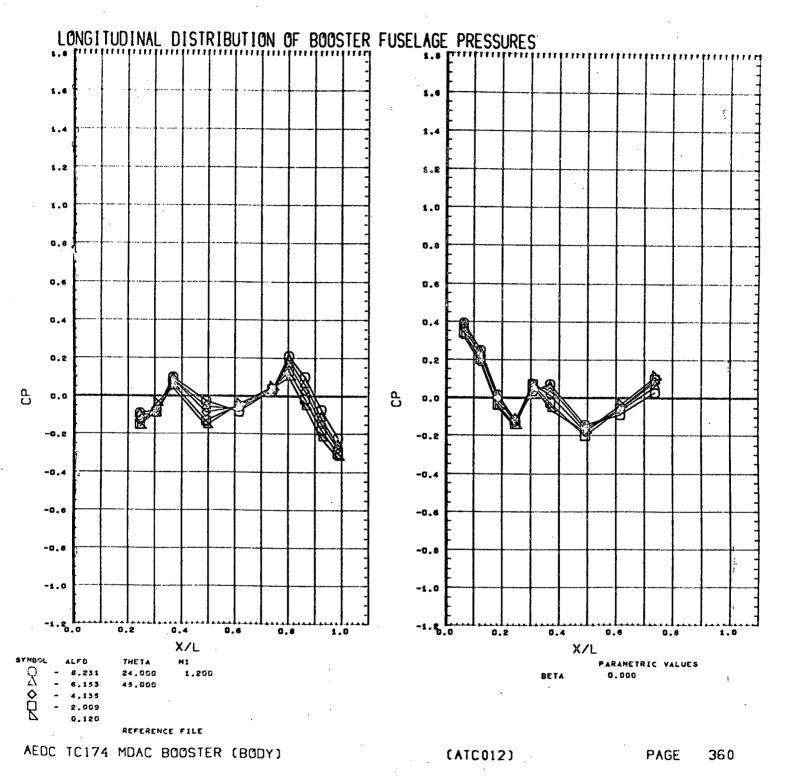


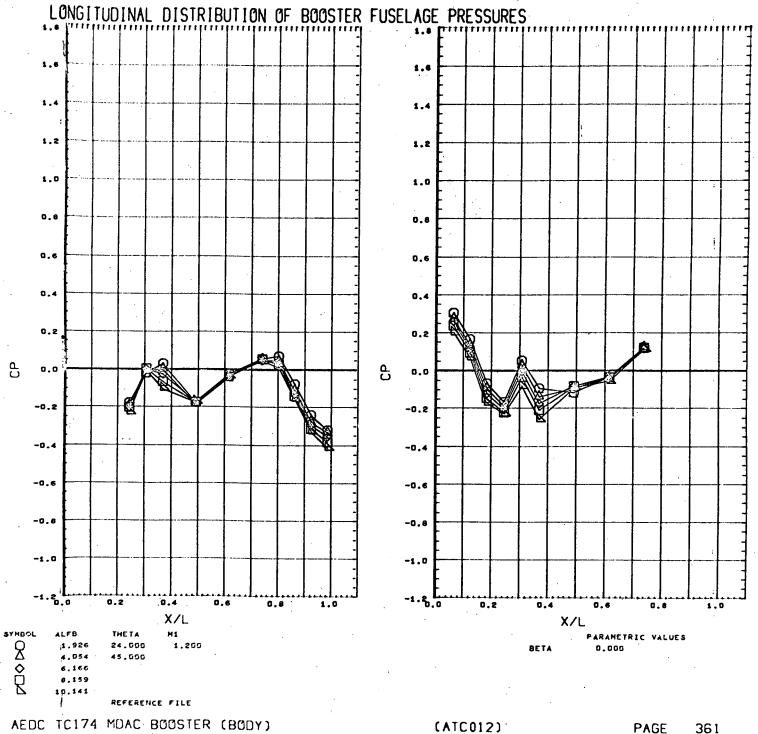


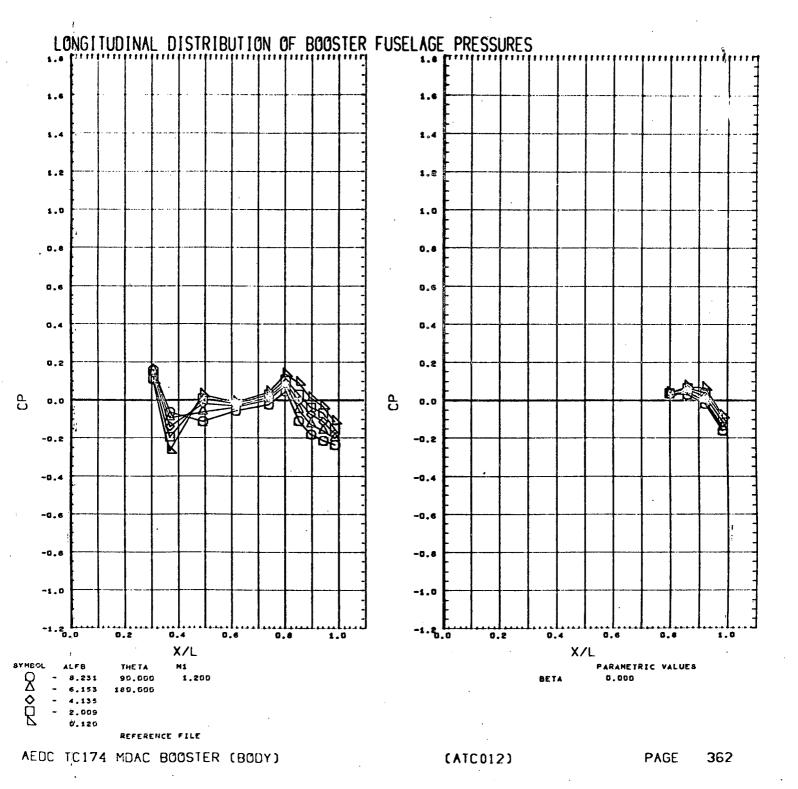


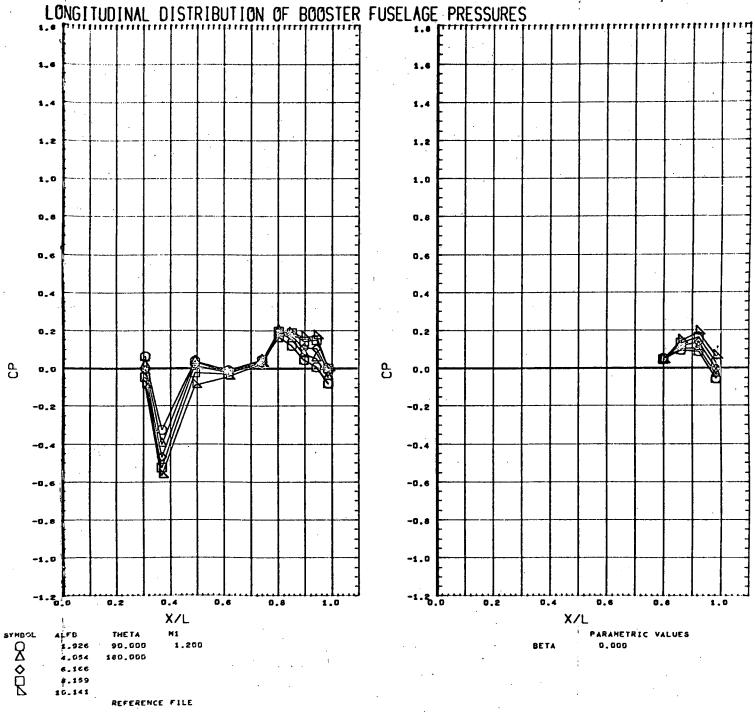
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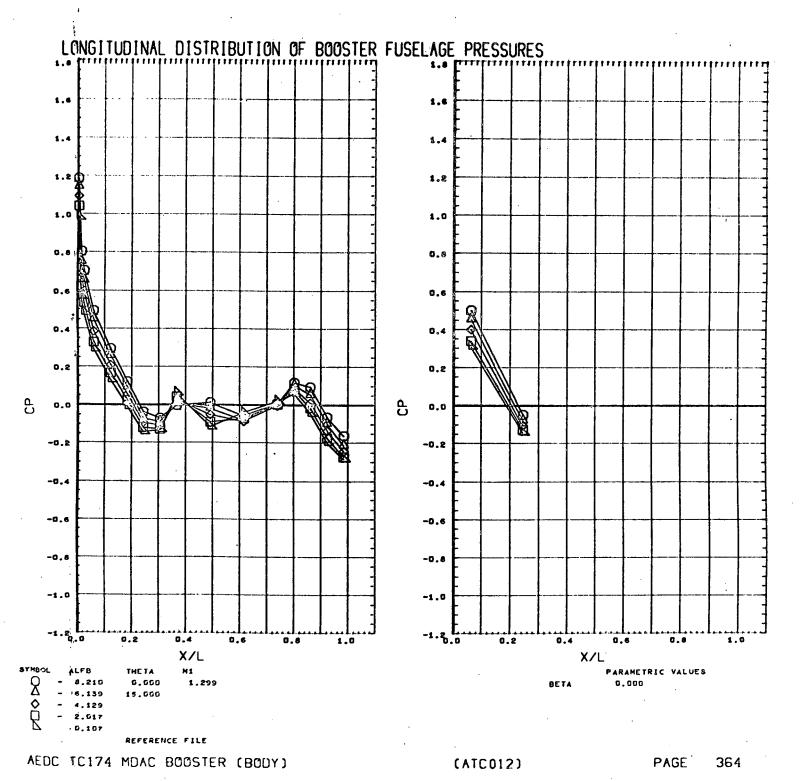


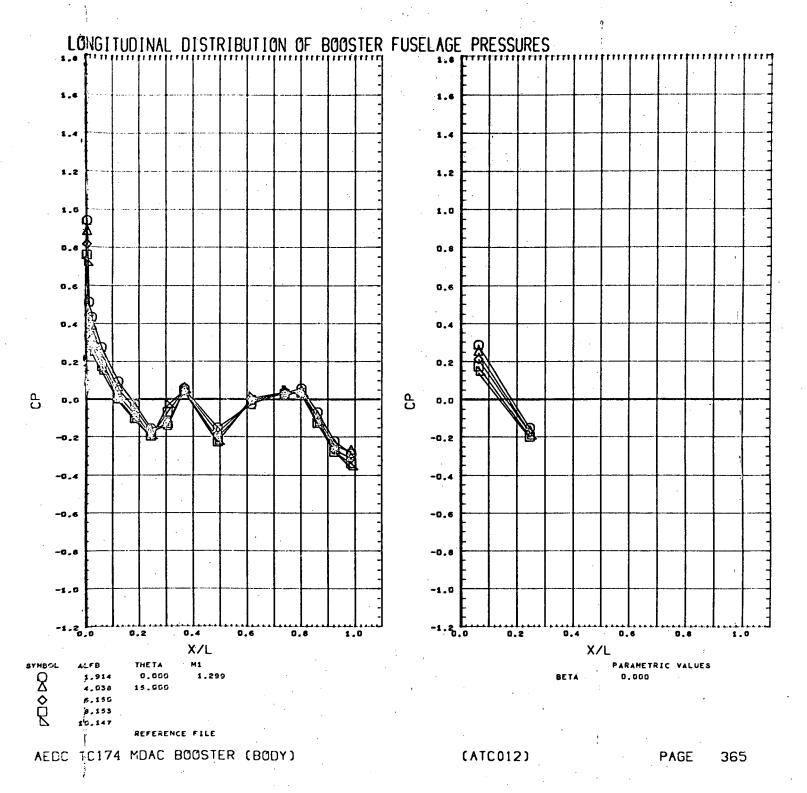


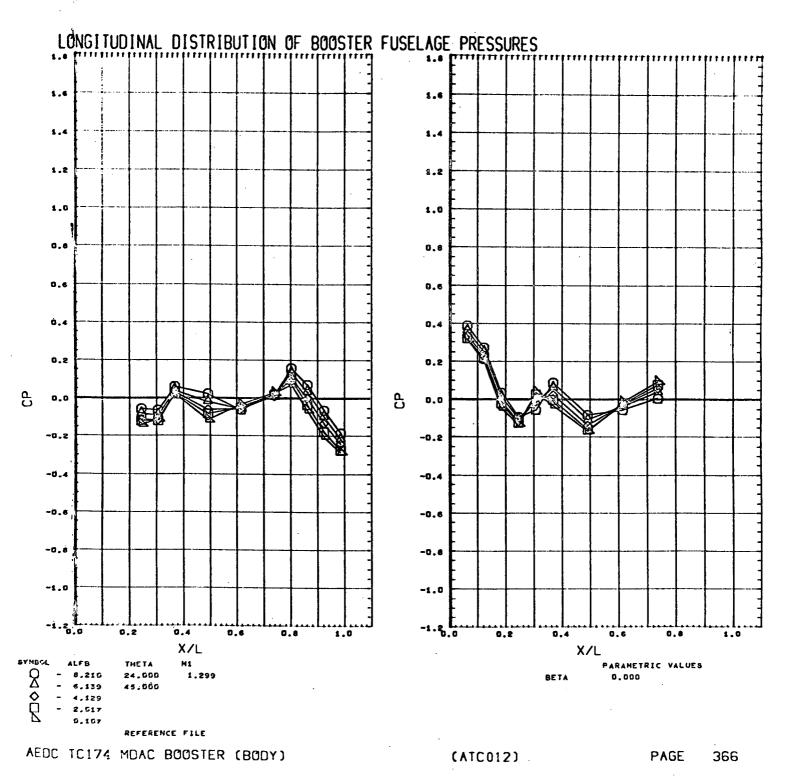
AEDC TC174 MDAC BOOSTER (BODY)

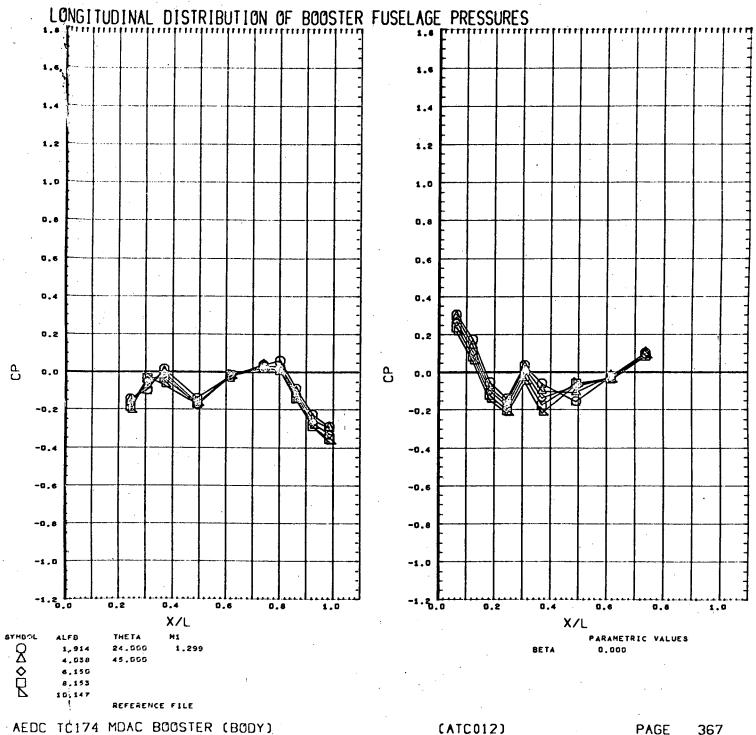
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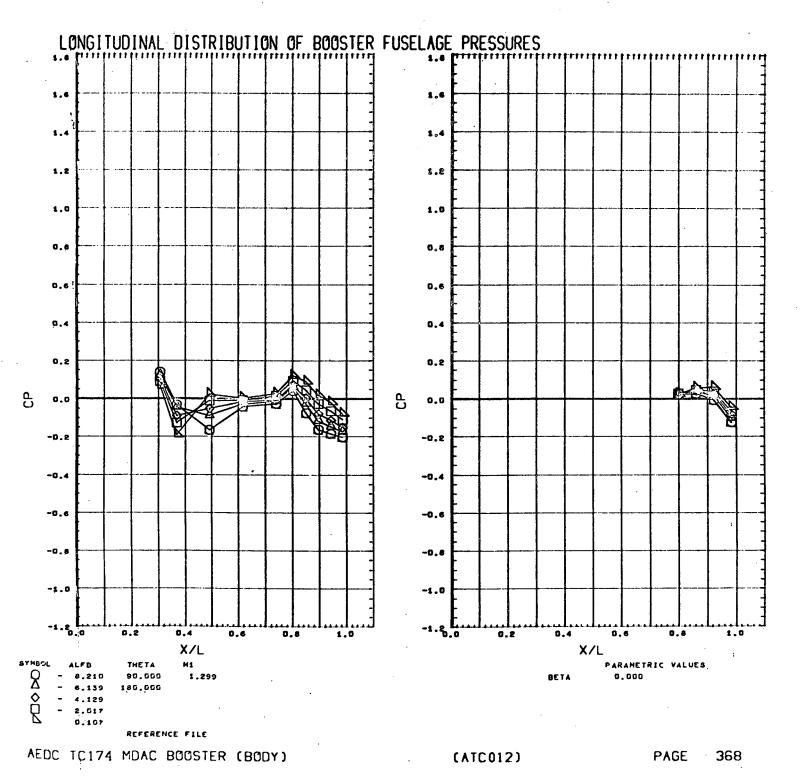


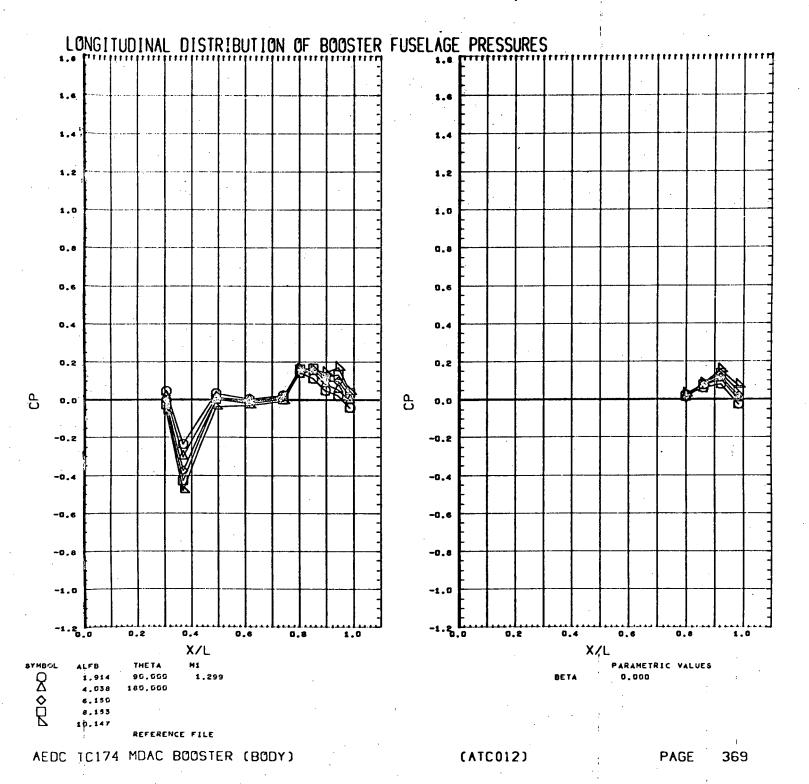


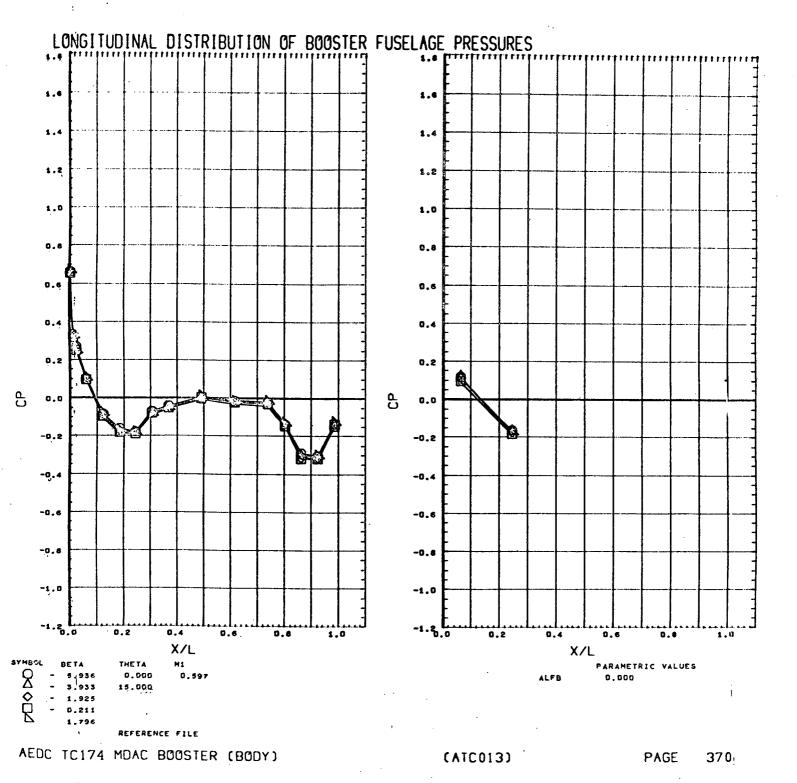


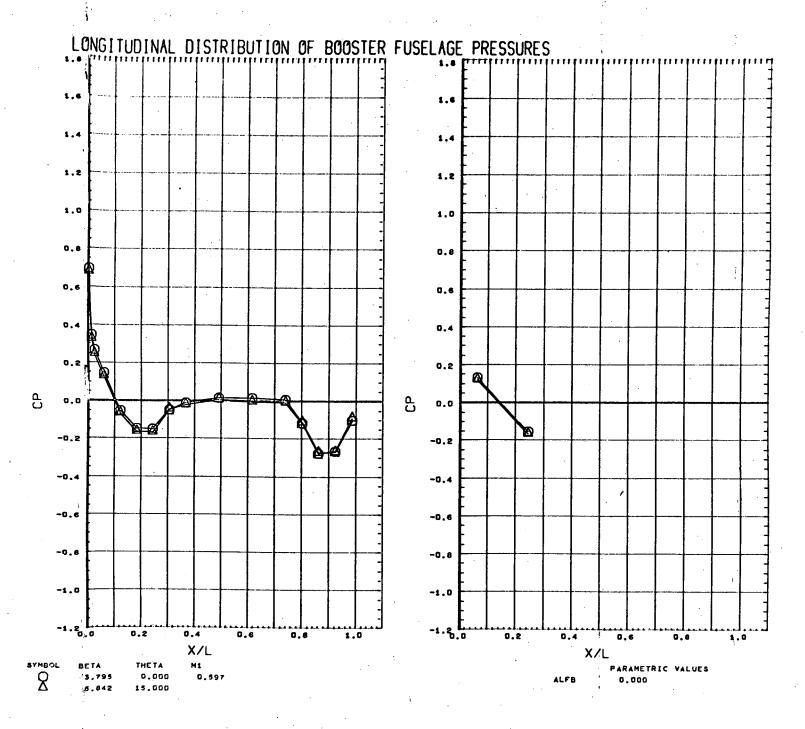
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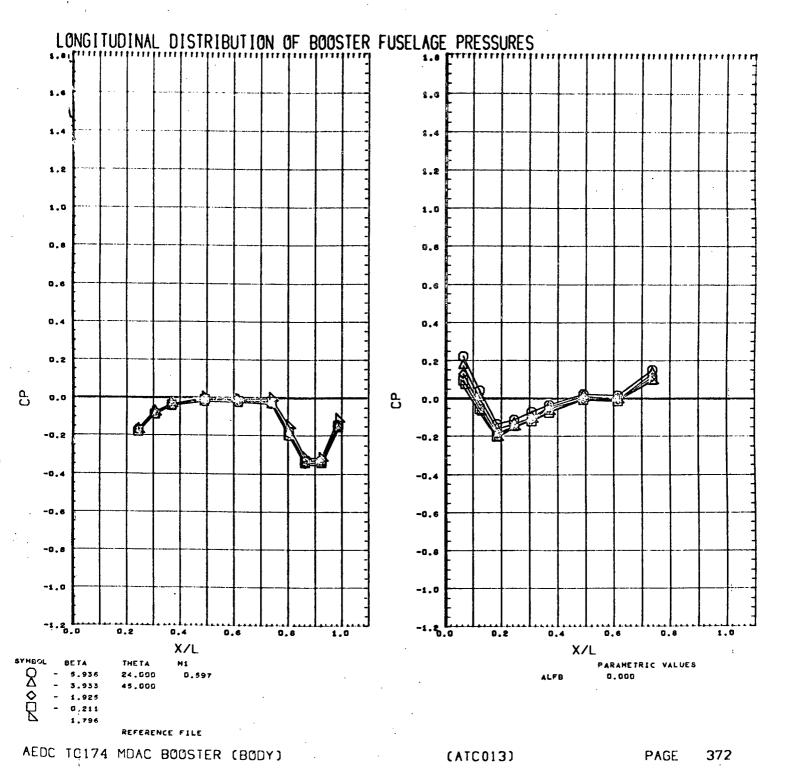


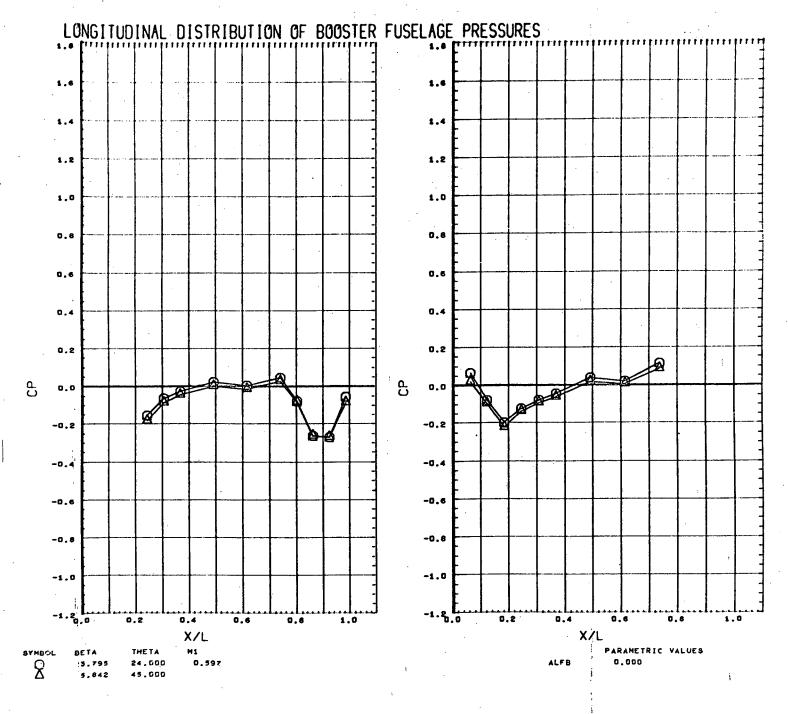




AEDC *C174 MDAC BOOSTER (BODY)

(ATC013)

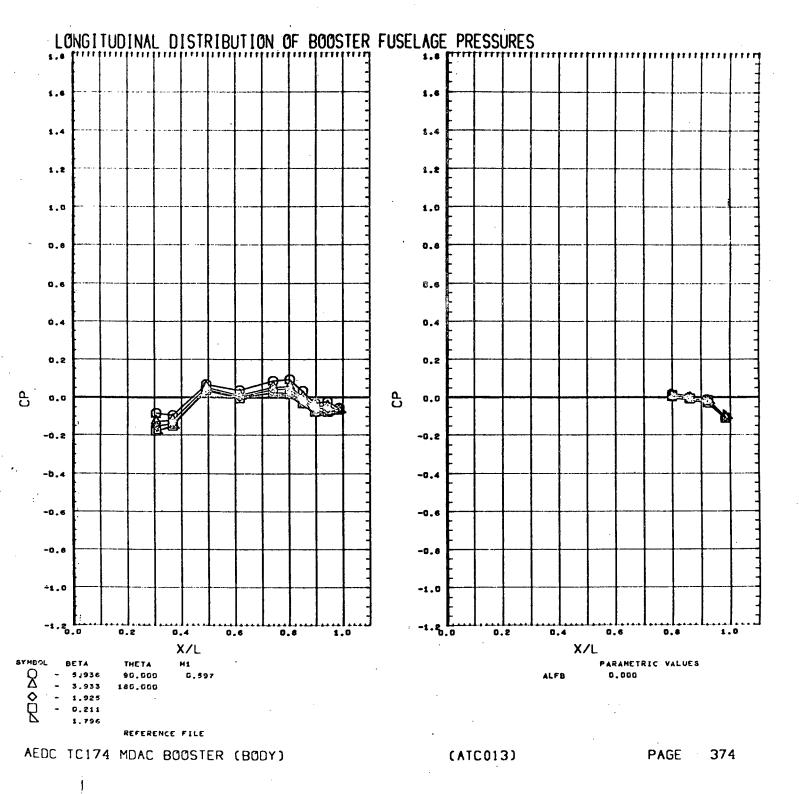


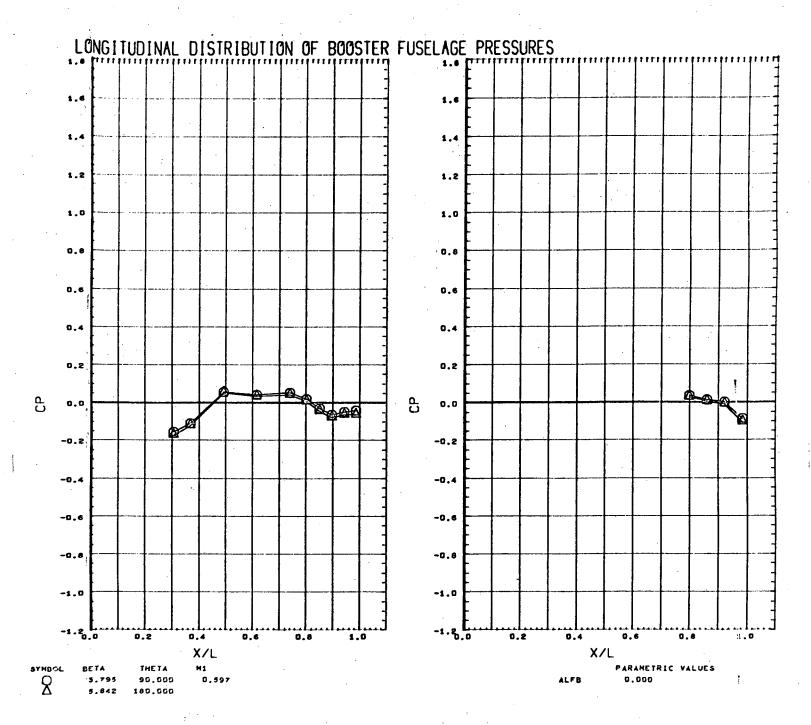


AEDC TC174 MDAC BOOSTER (BODY)

(ATC013)

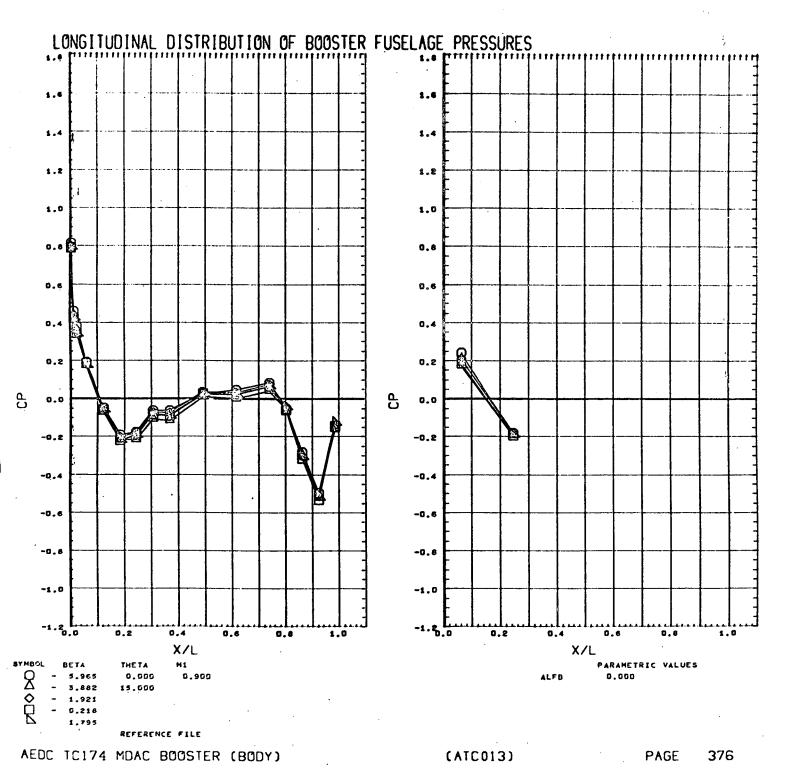
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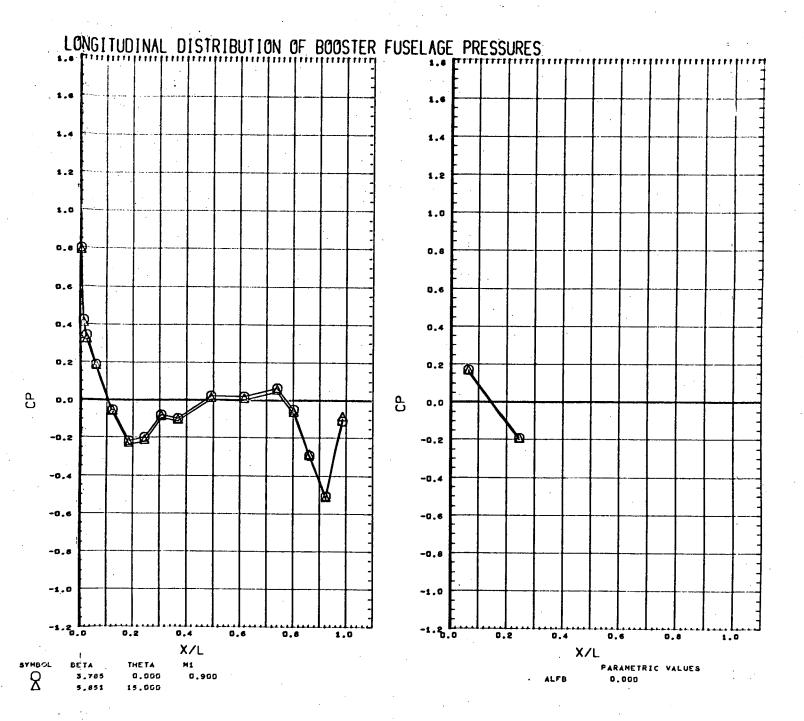




AEDC TC174 MDAC BOOSTER (BODY)

(ATC013)

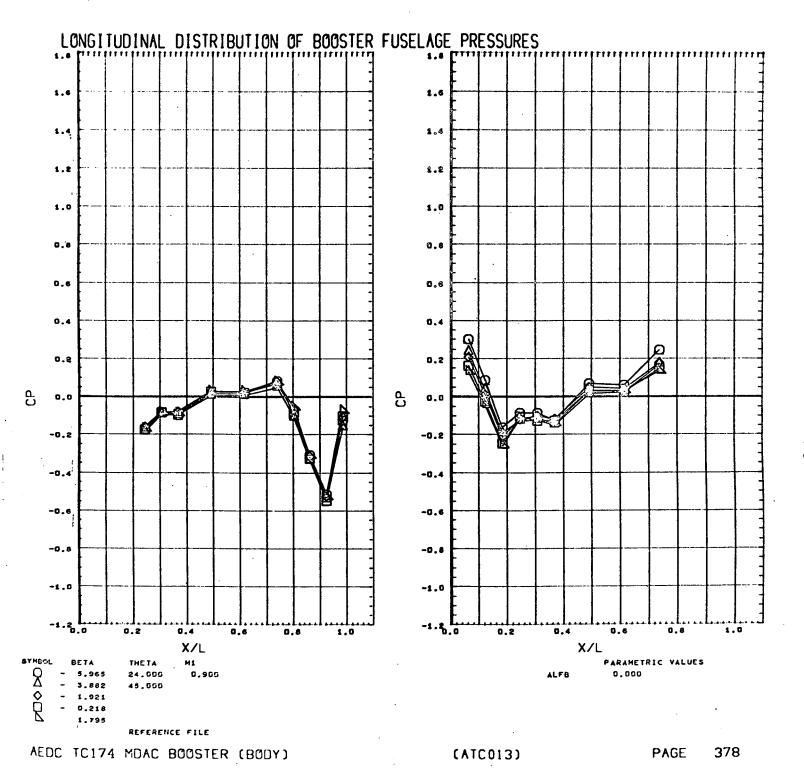


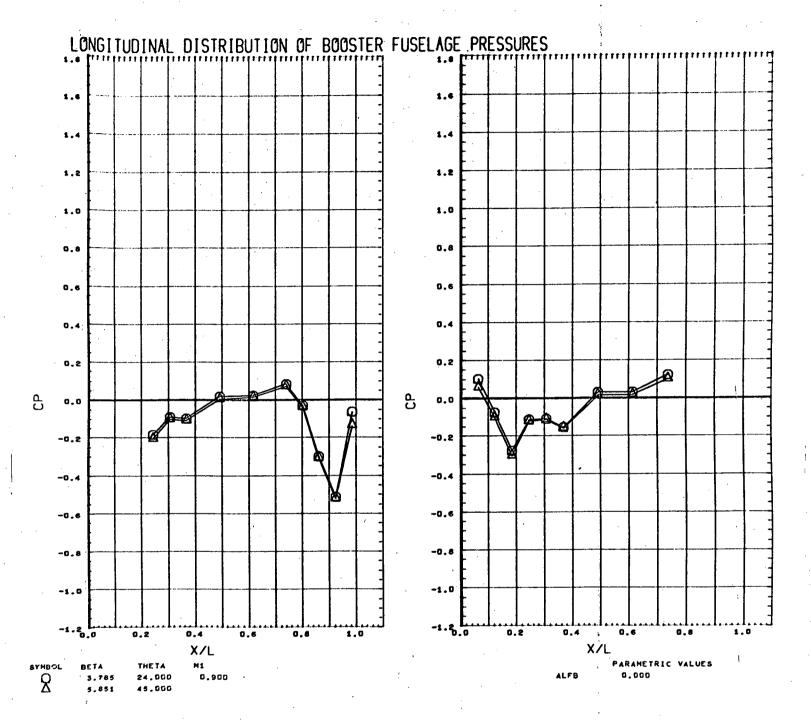


AEDC TC174 MDAC BOOSTER (BODY)

(ATC013)

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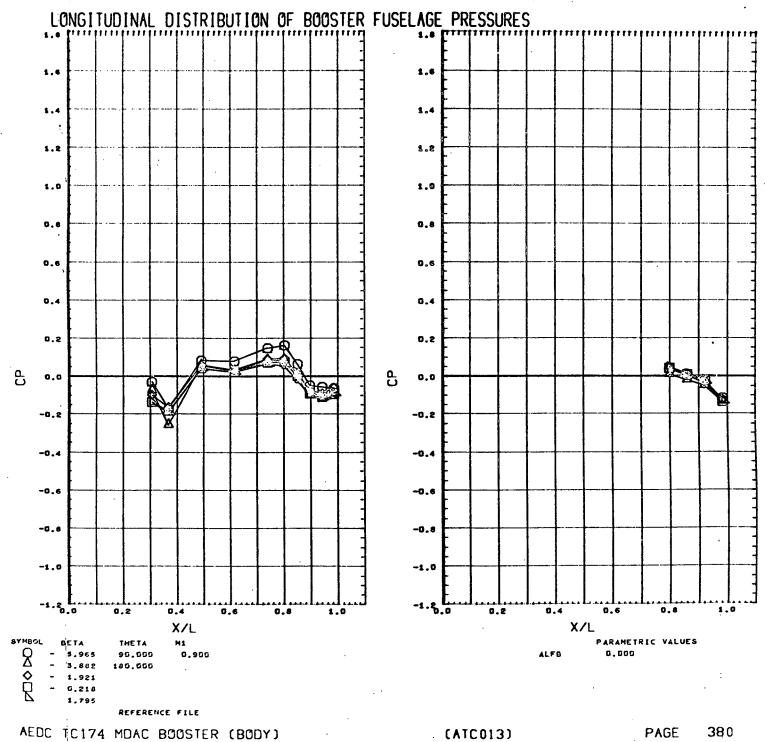




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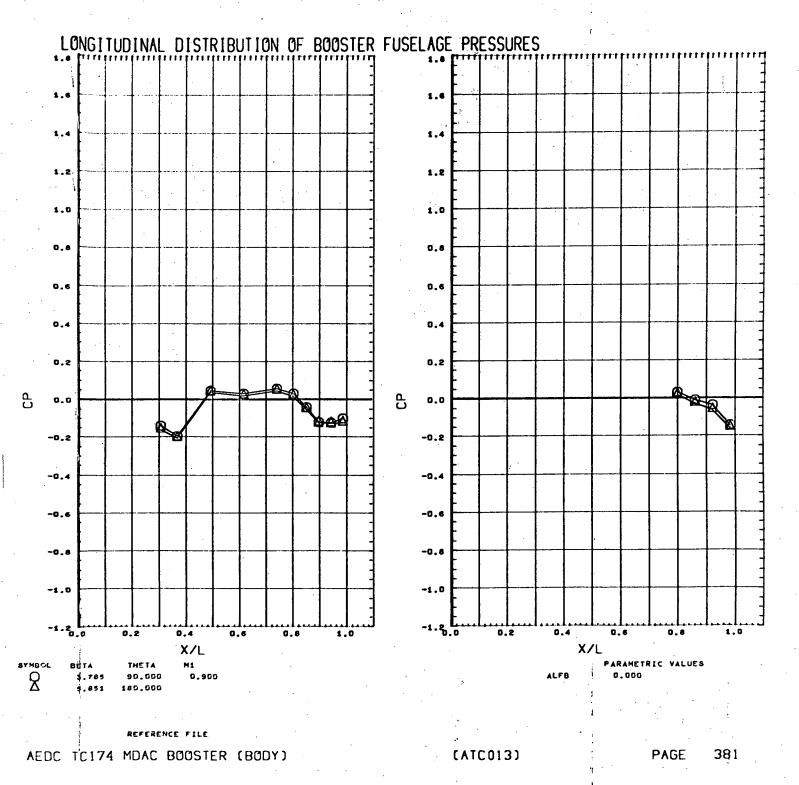
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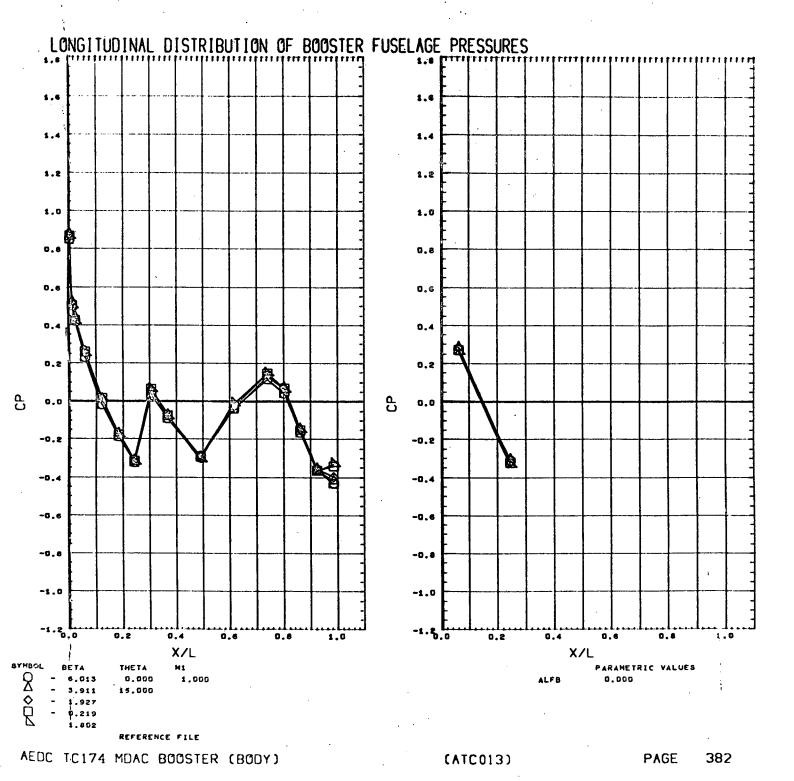
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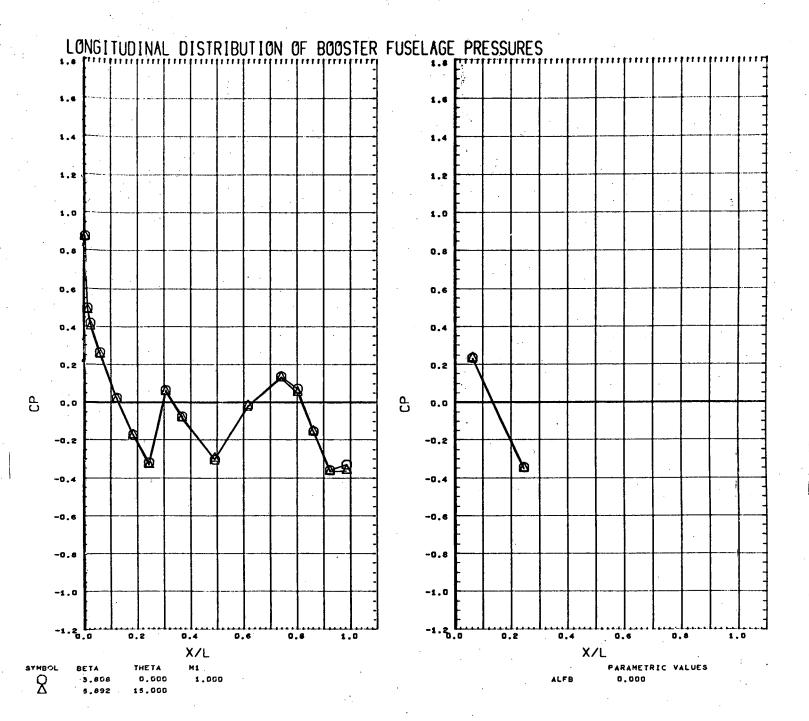


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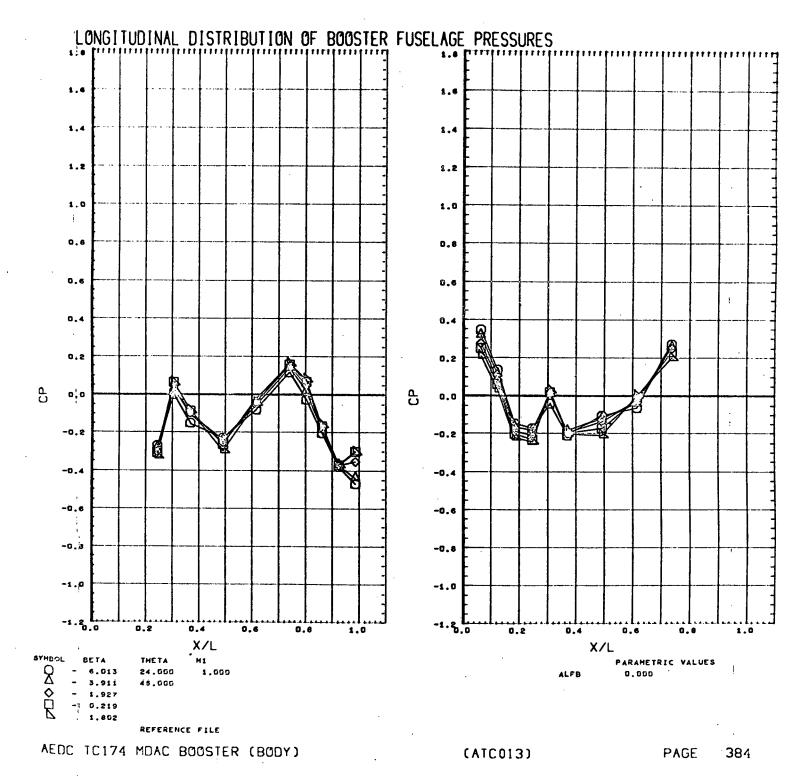


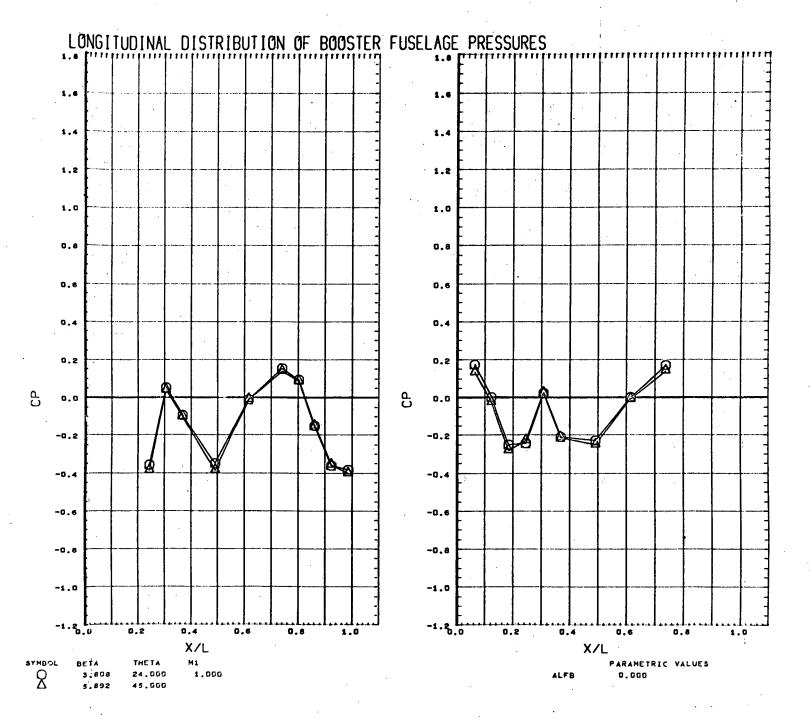


AEDC TC174 MDAC BOOSTER (BODY)

(ATC013)

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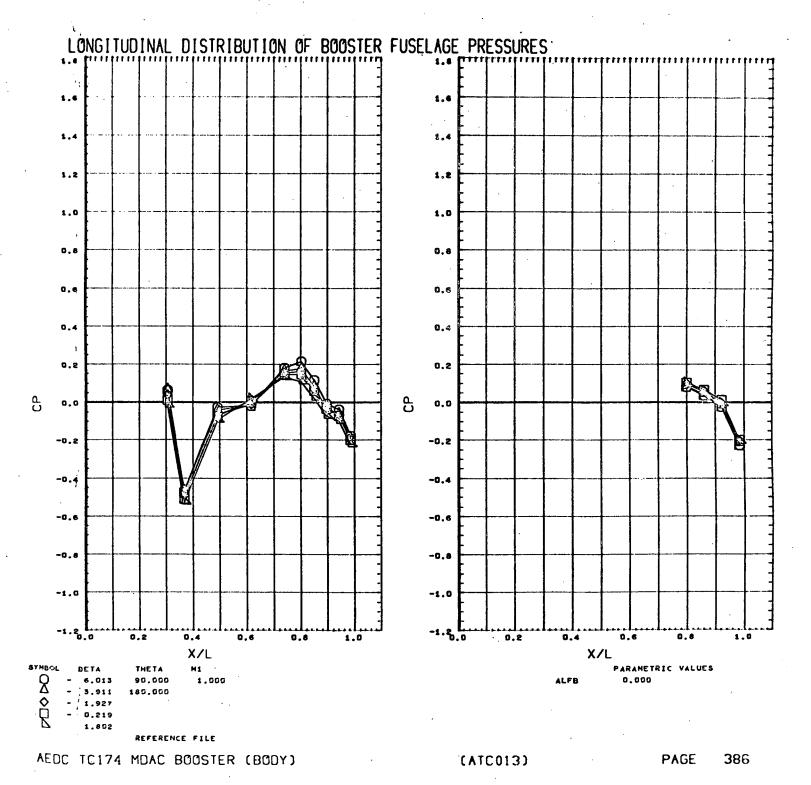


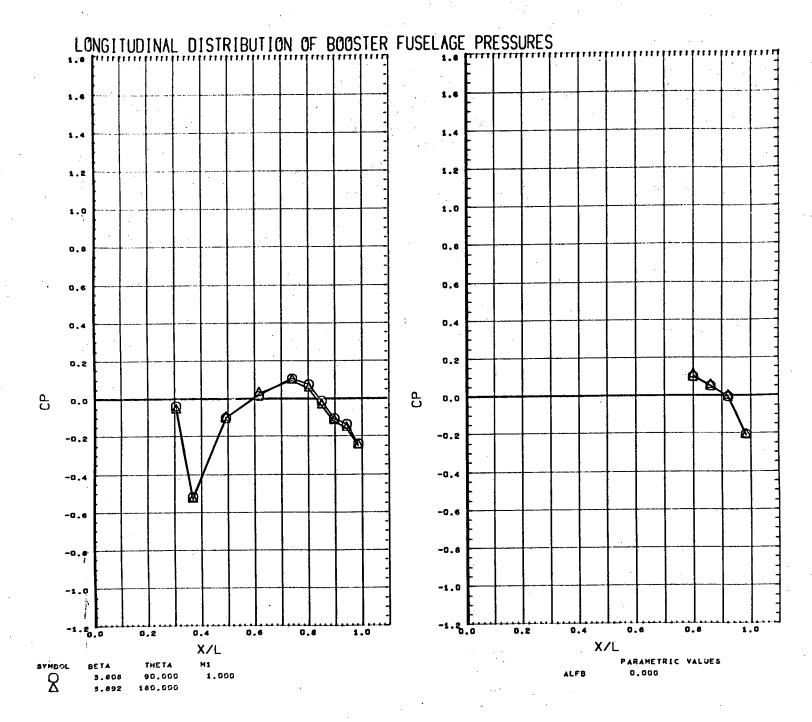


AEDC T0174 MDAC BOOSTER (BODY)

(ATC013)

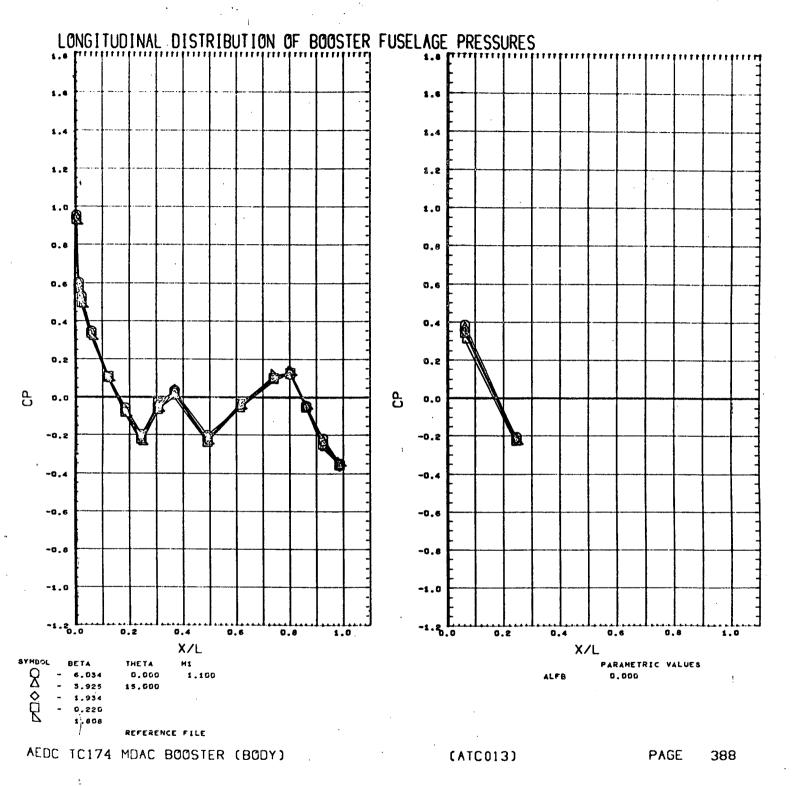
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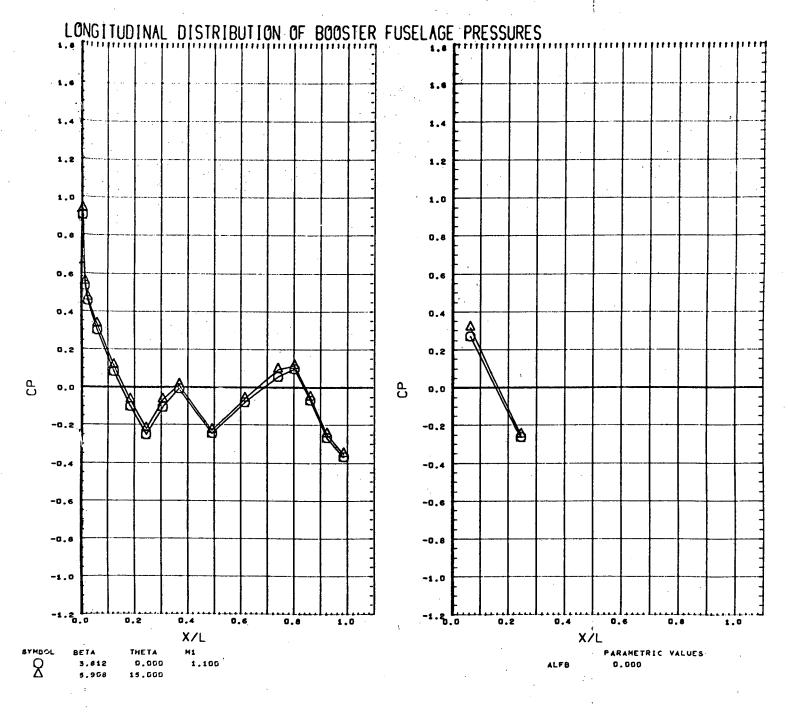




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(ATC013)

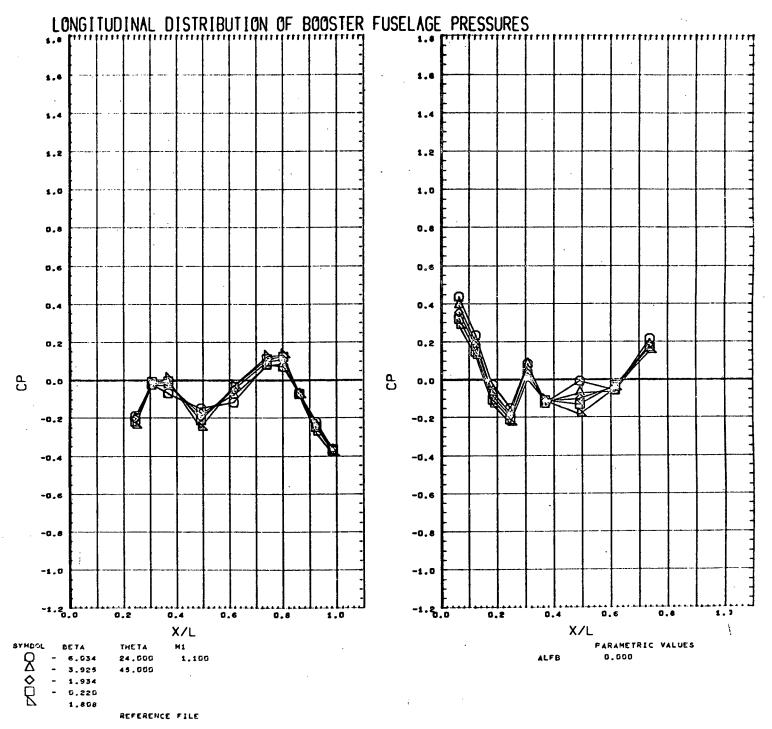




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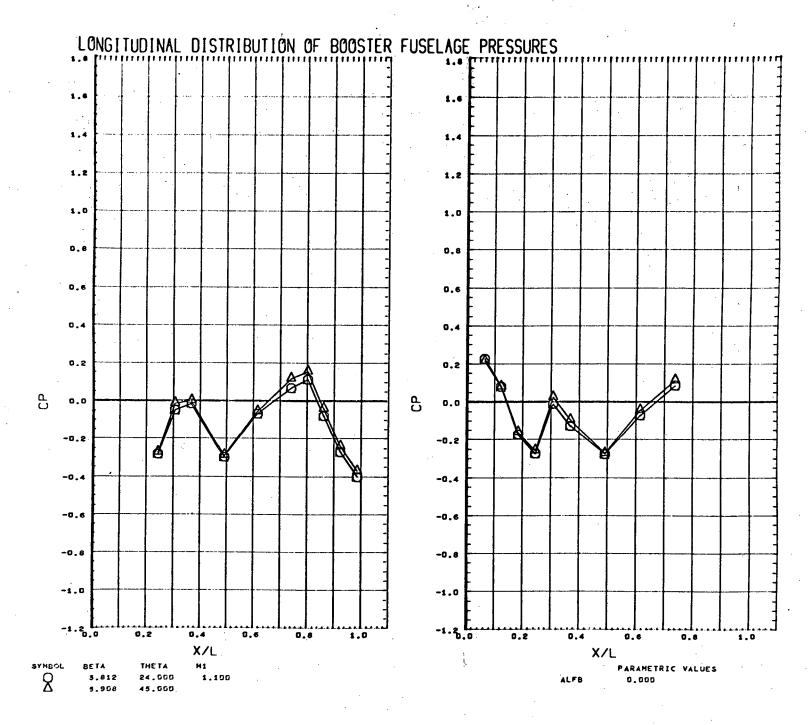
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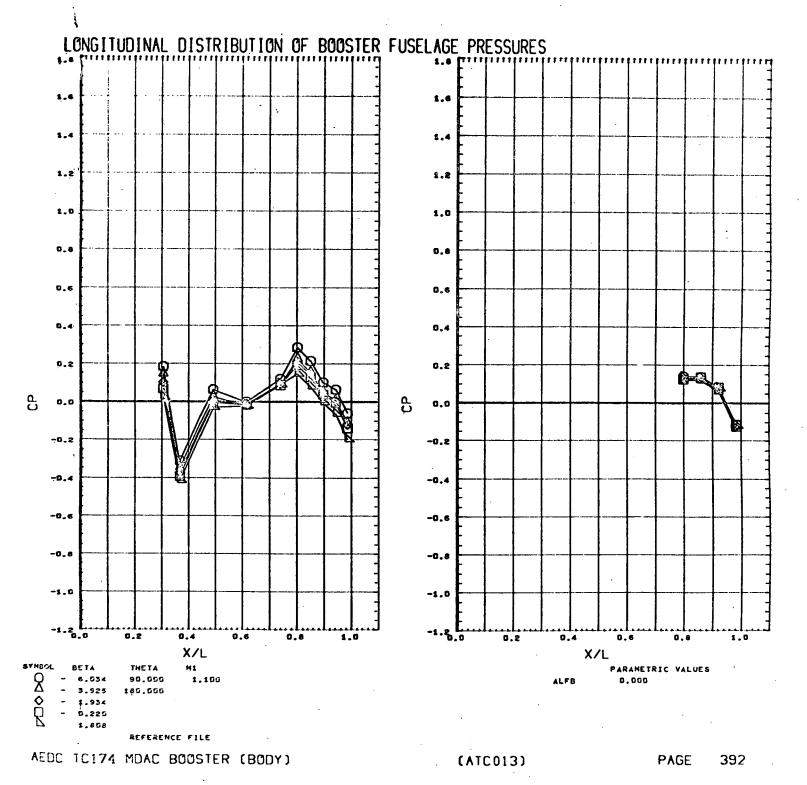
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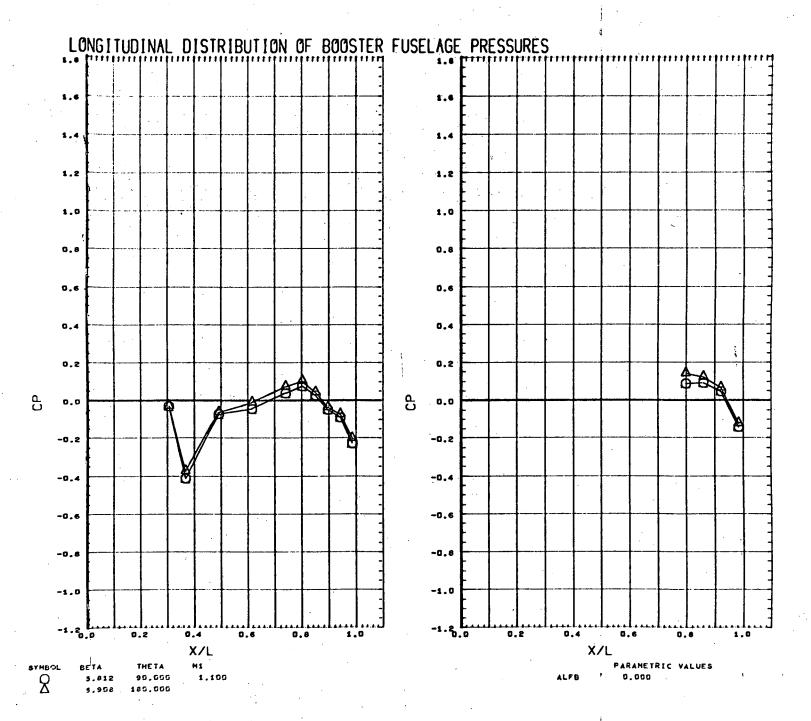
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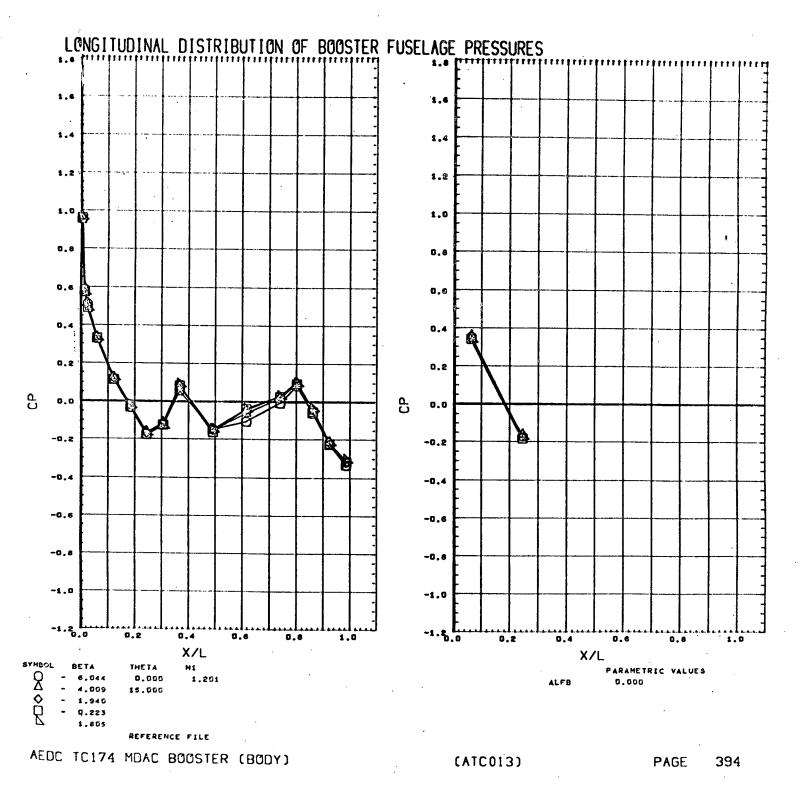
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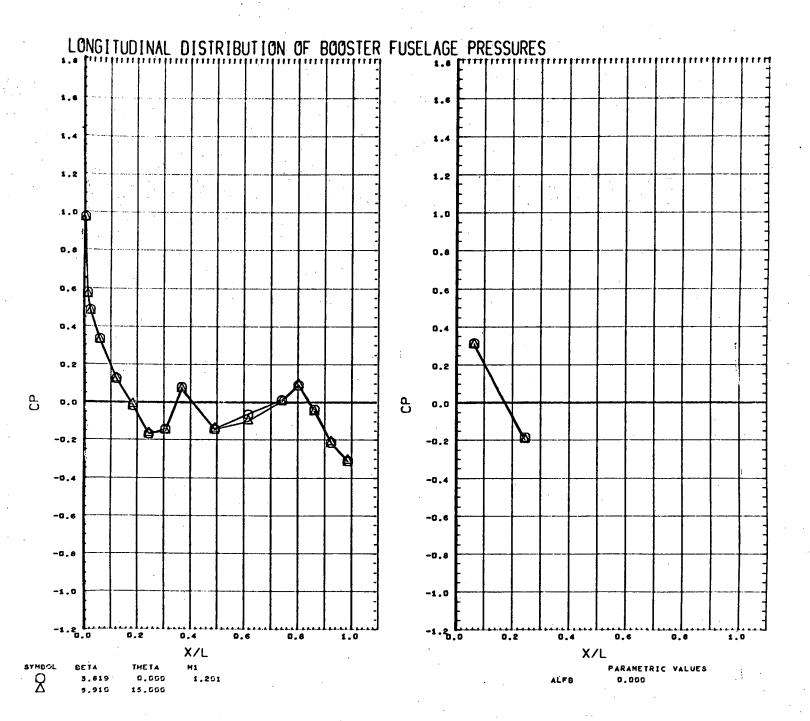




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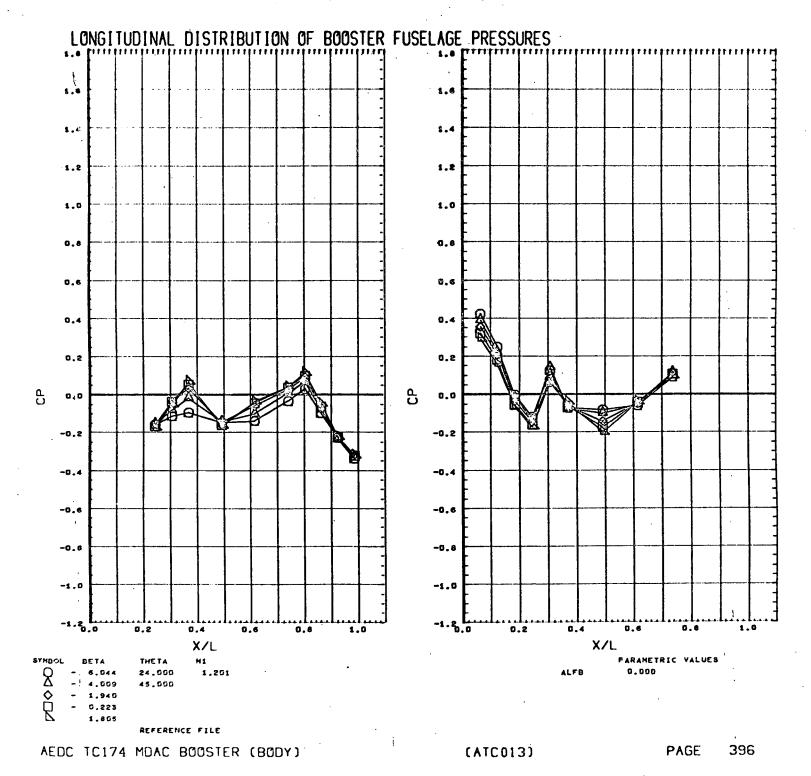


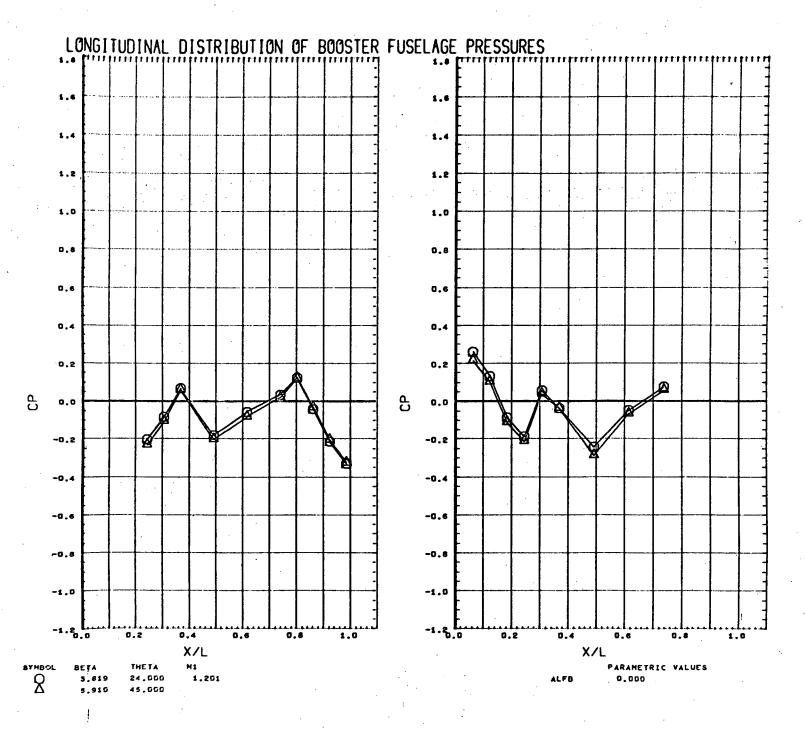


AEDC TC174 MDAC BOOSTER (BODY)

(ATC013)

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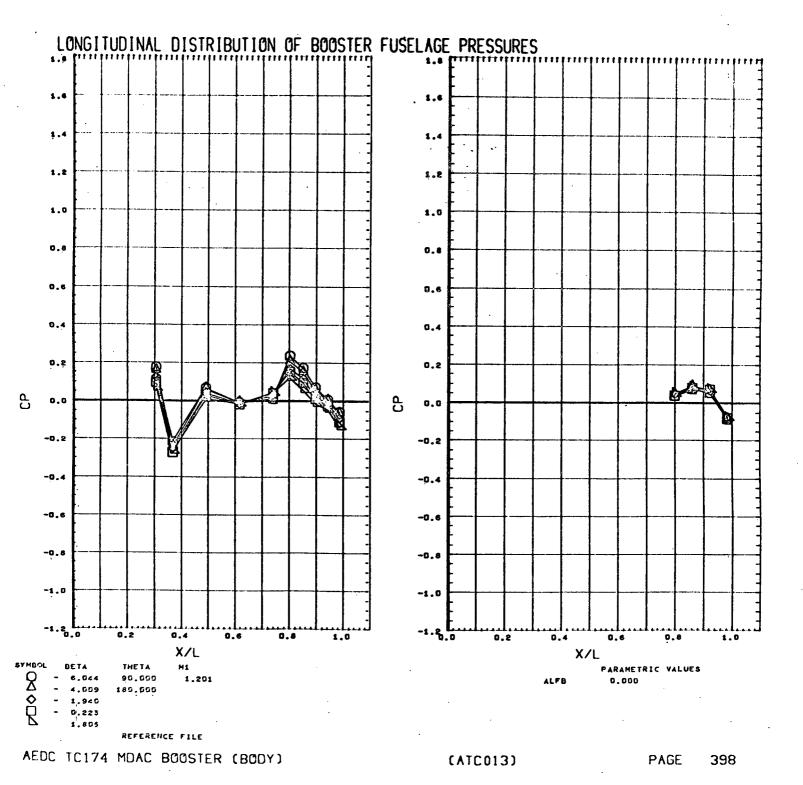


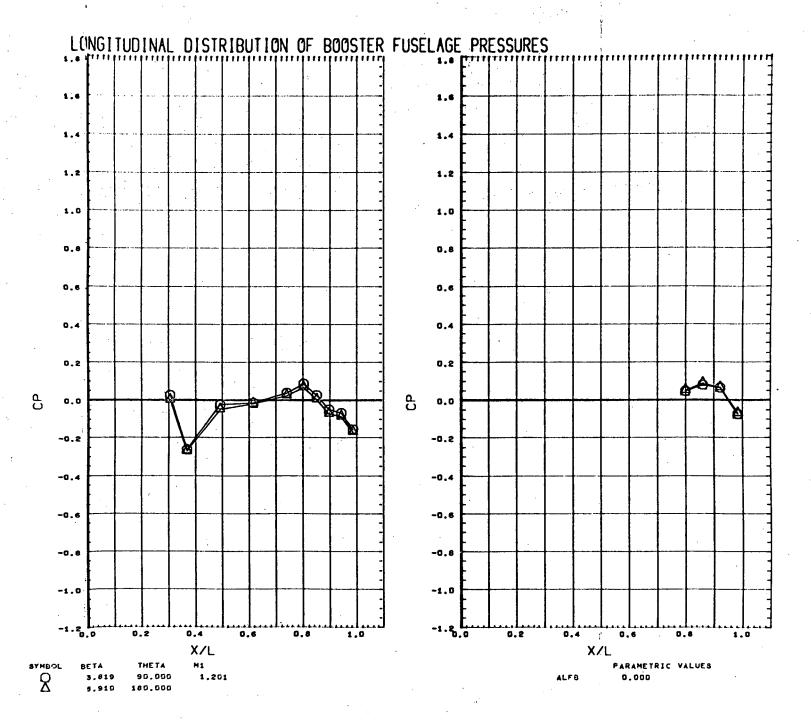


AEDC TC174 MDAC BOOSTER (BODY)

(ATC013)

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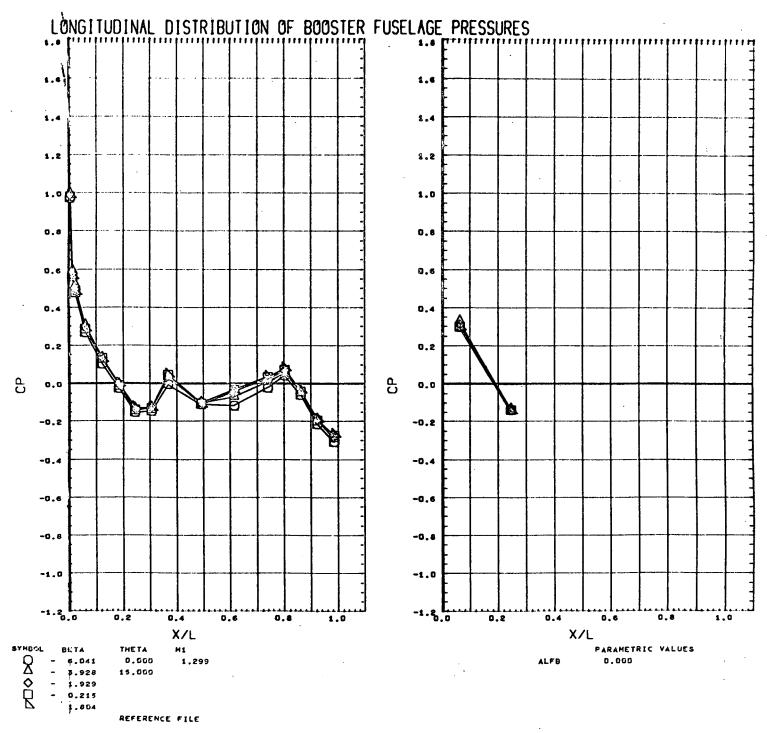




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(ATC013)

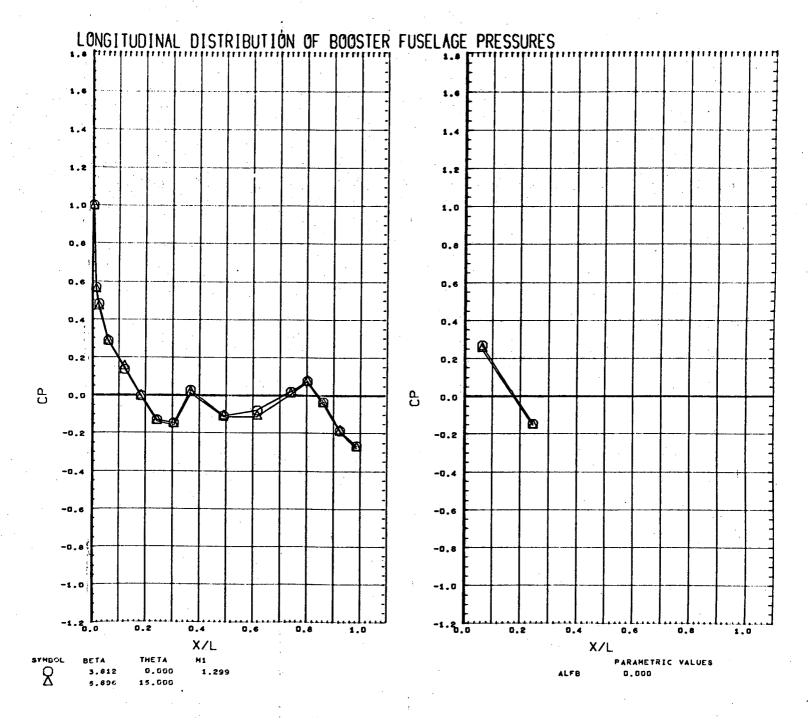
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AEDC TC174 MDAC BOOSTER (BODY)

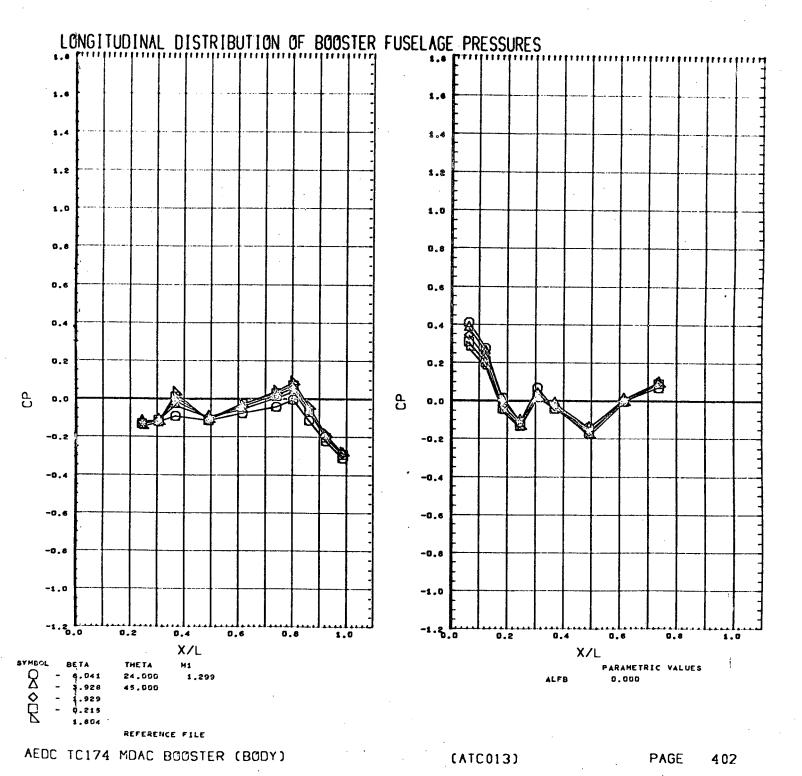
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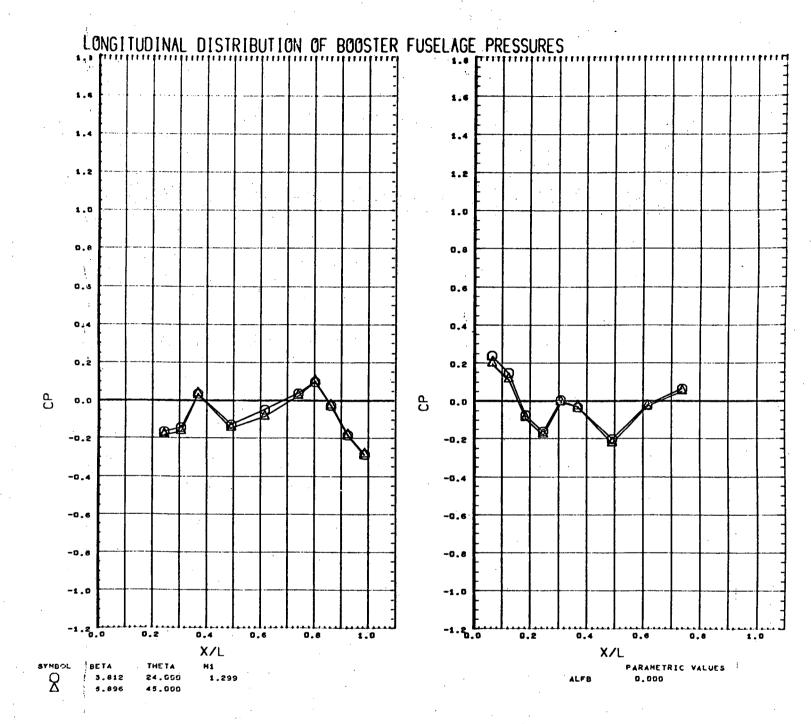
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AEDC TC174 MDAC BOOSTER (BODY)

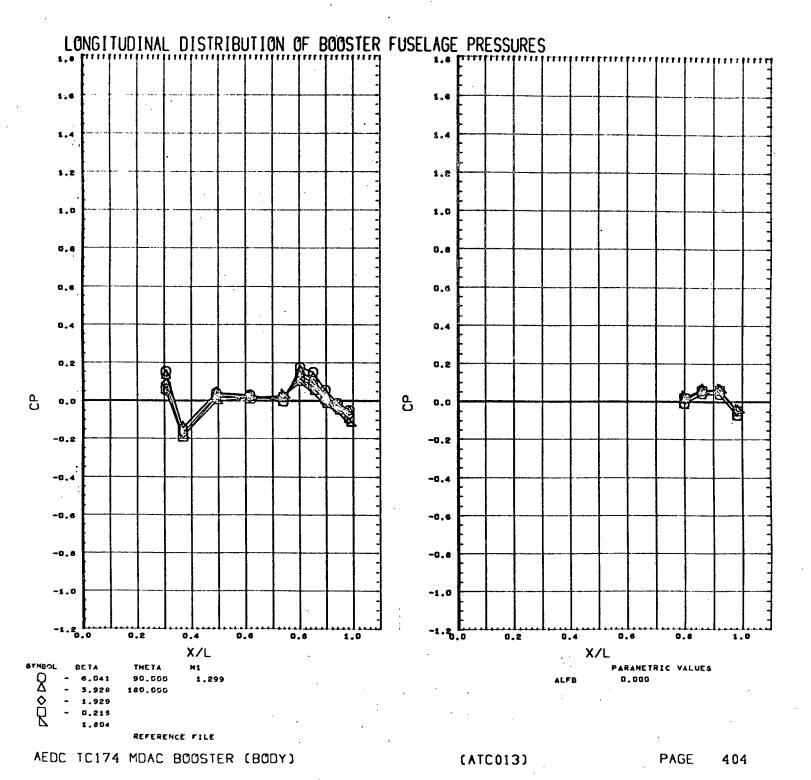
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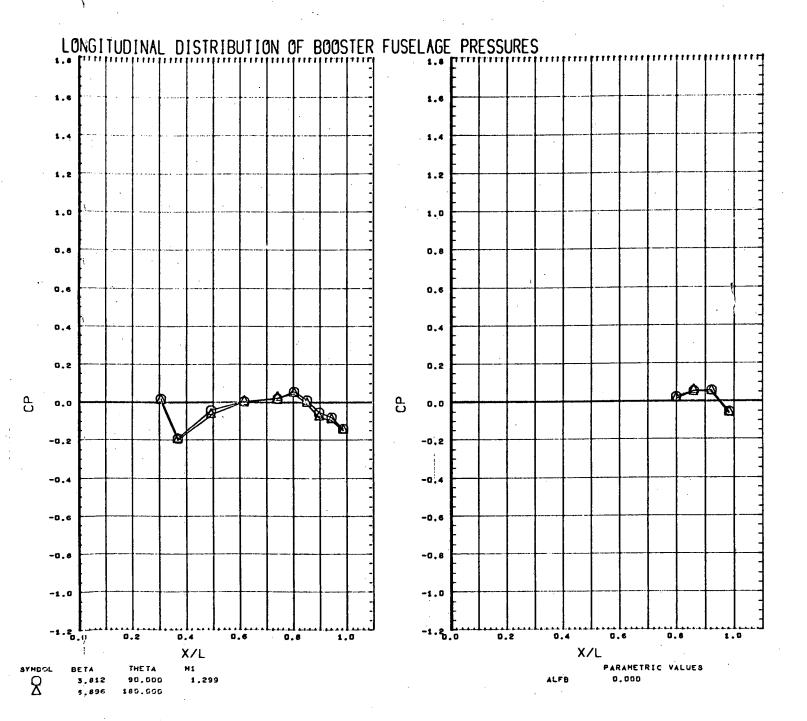




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(ATC013)

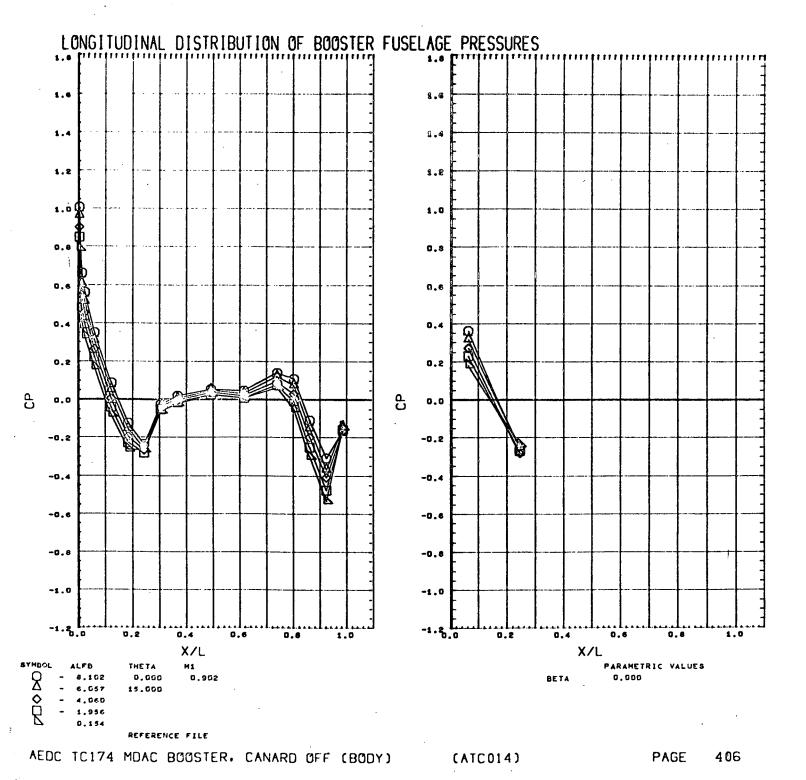


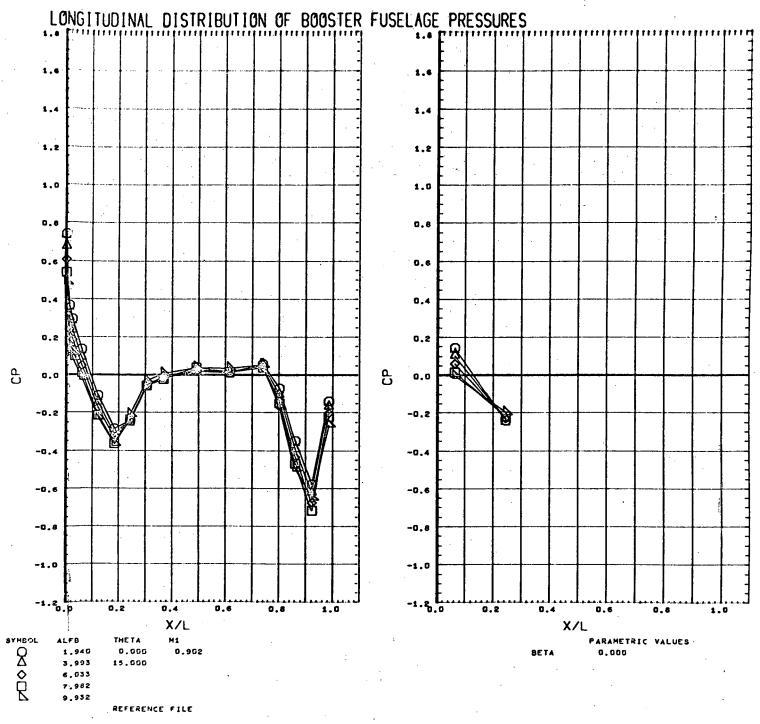


AEDC TC174 MDAC BOOSTER (BODY)

(ATC013)

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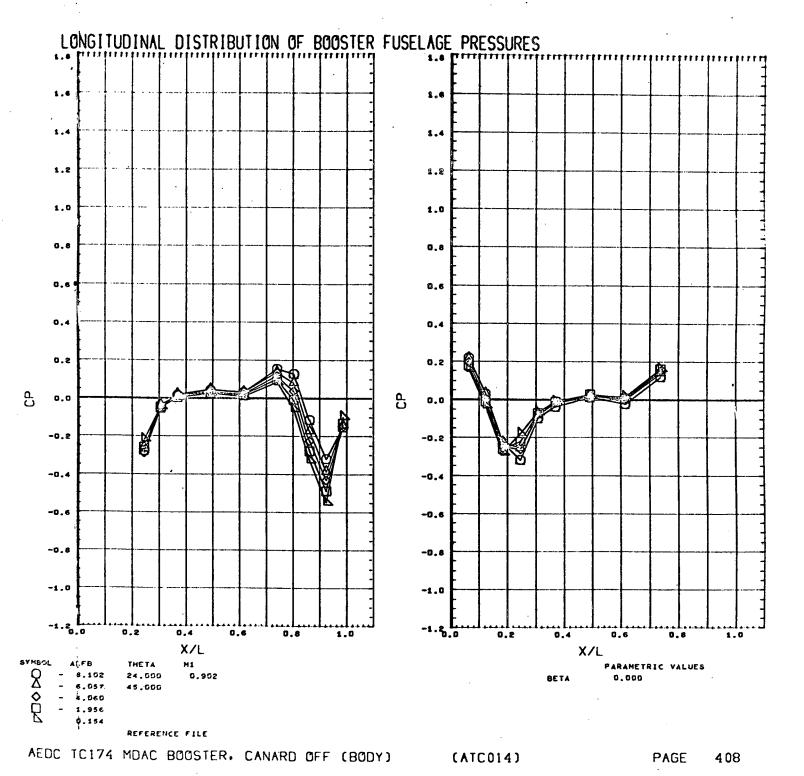


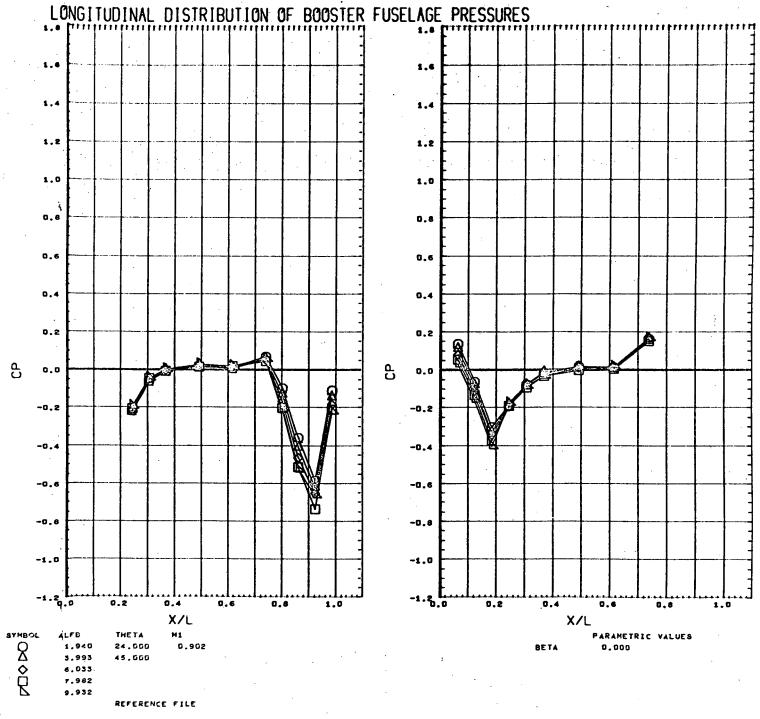


AEDC TC174 MDAC BOOSTER, CANARD OFF (BODY)

(ATC014)

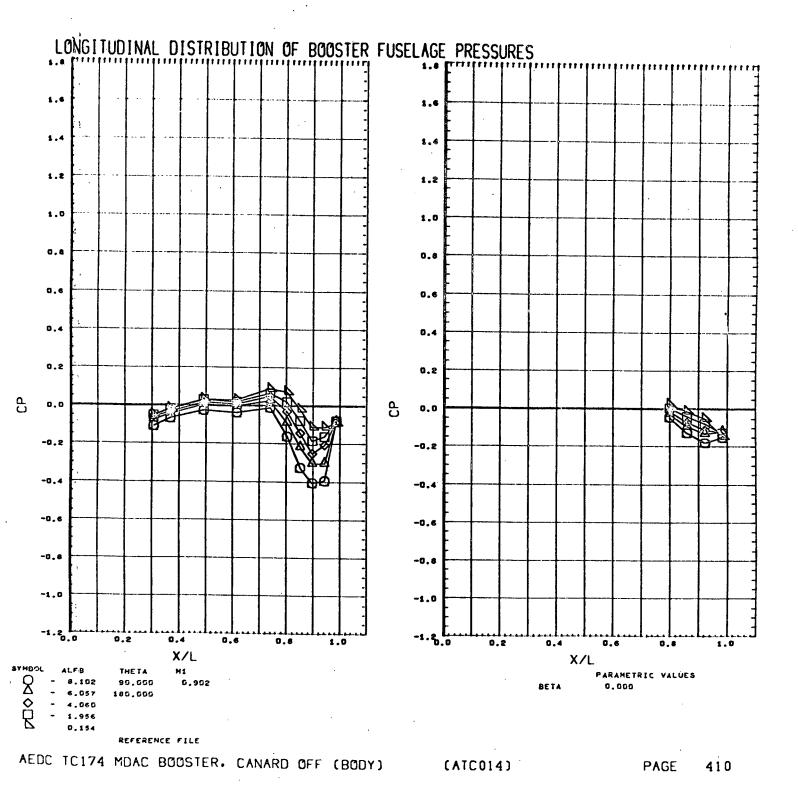
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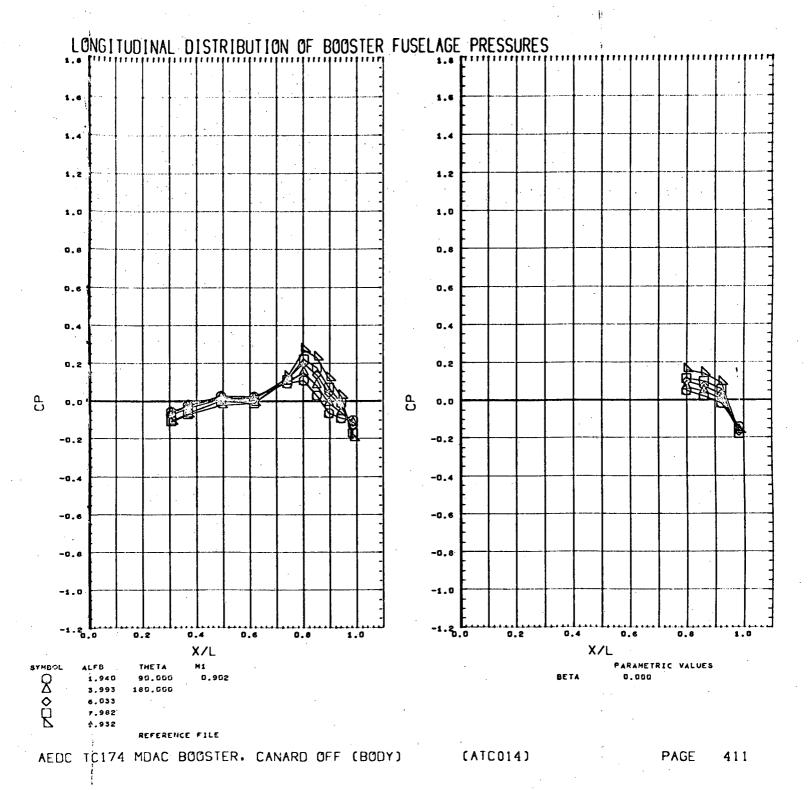


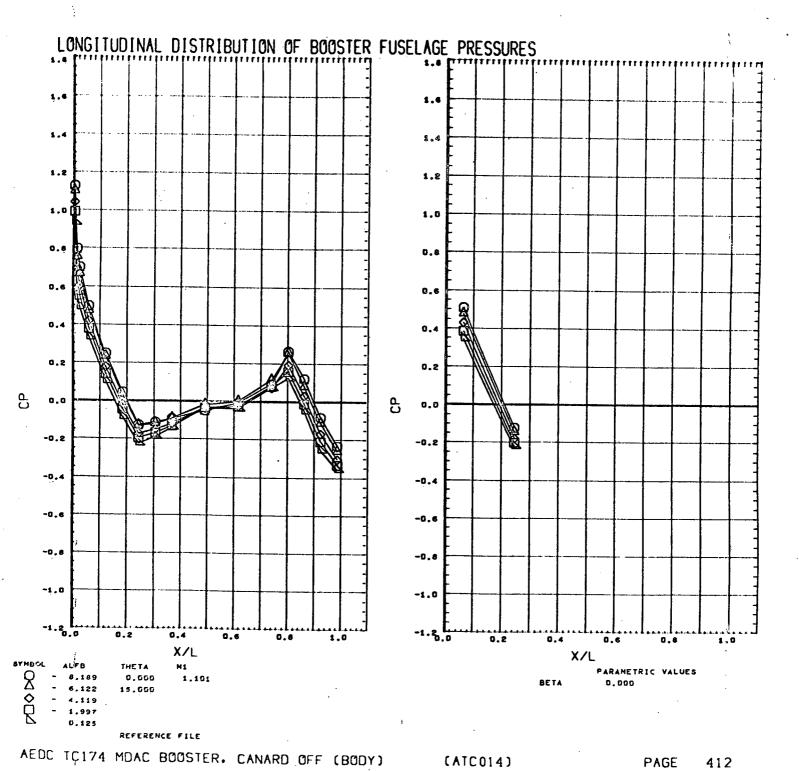


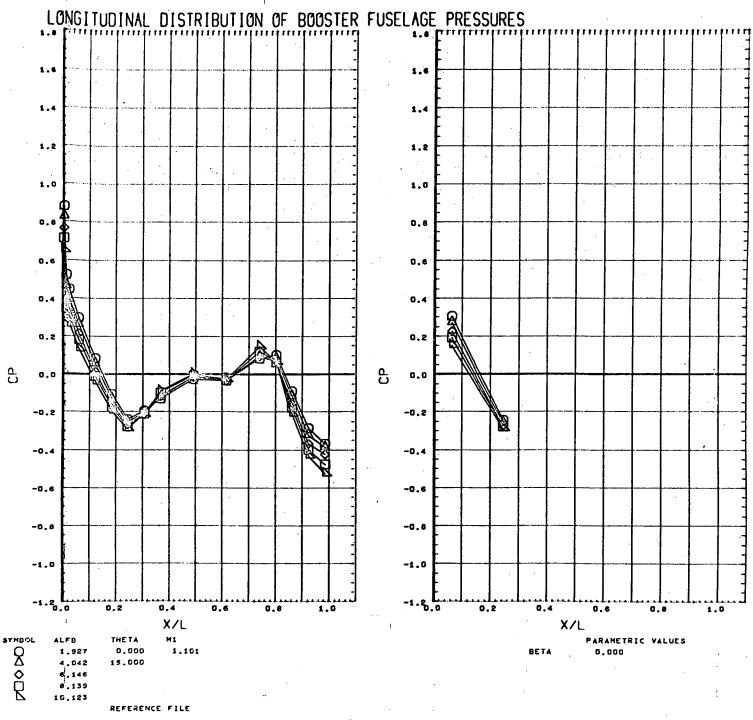
AEDC TC174 MDAC BOOSTER. CANARD OFF (BODY)

(ATC014)





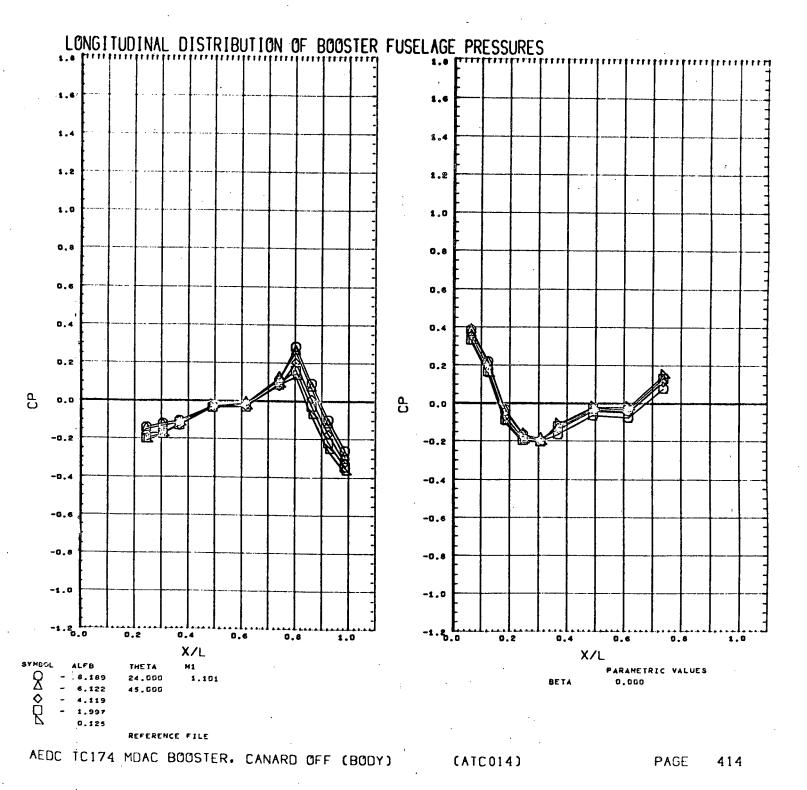


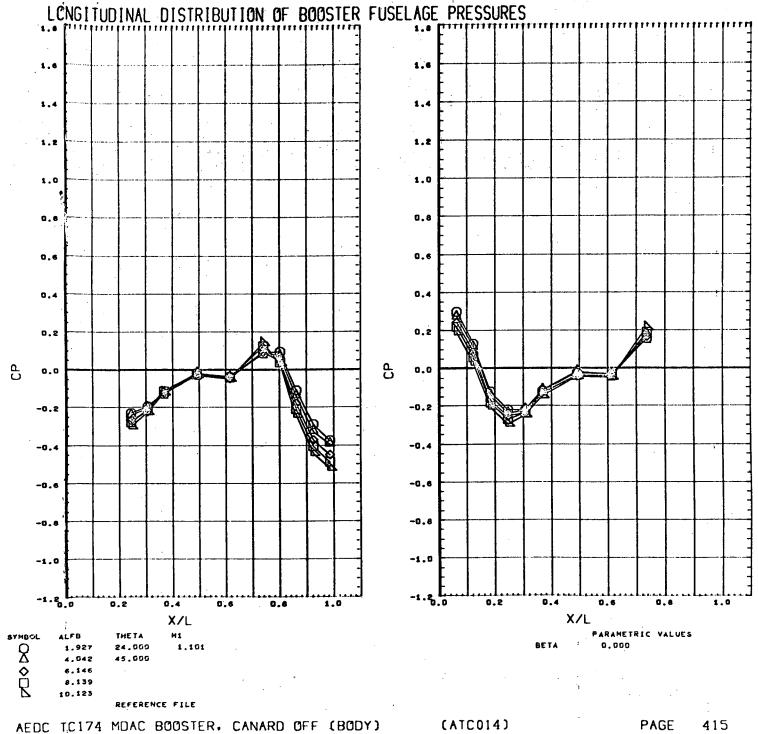


AEDC TC174 MDAC BOOSTER. CANARD OFF (BODY)

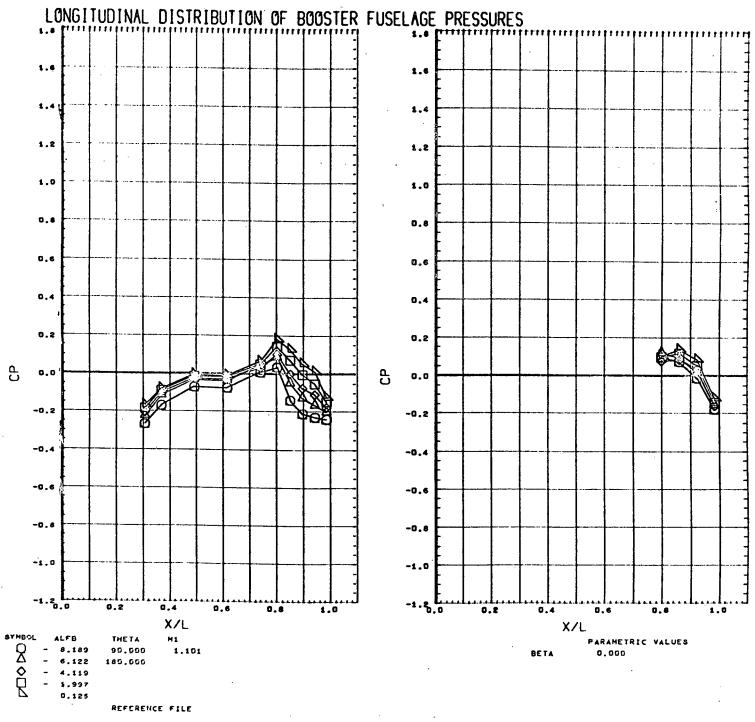
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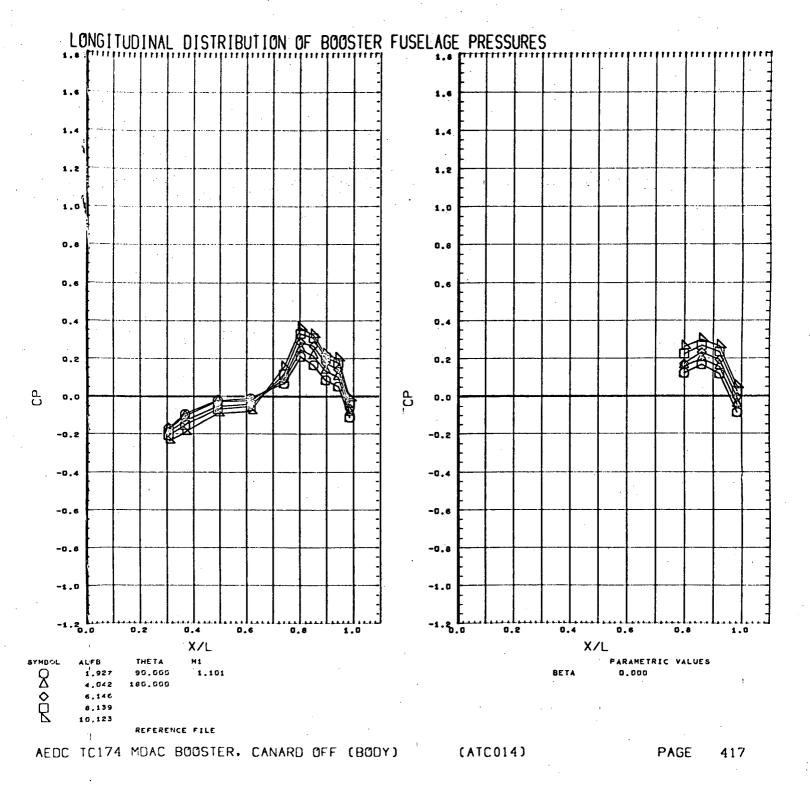


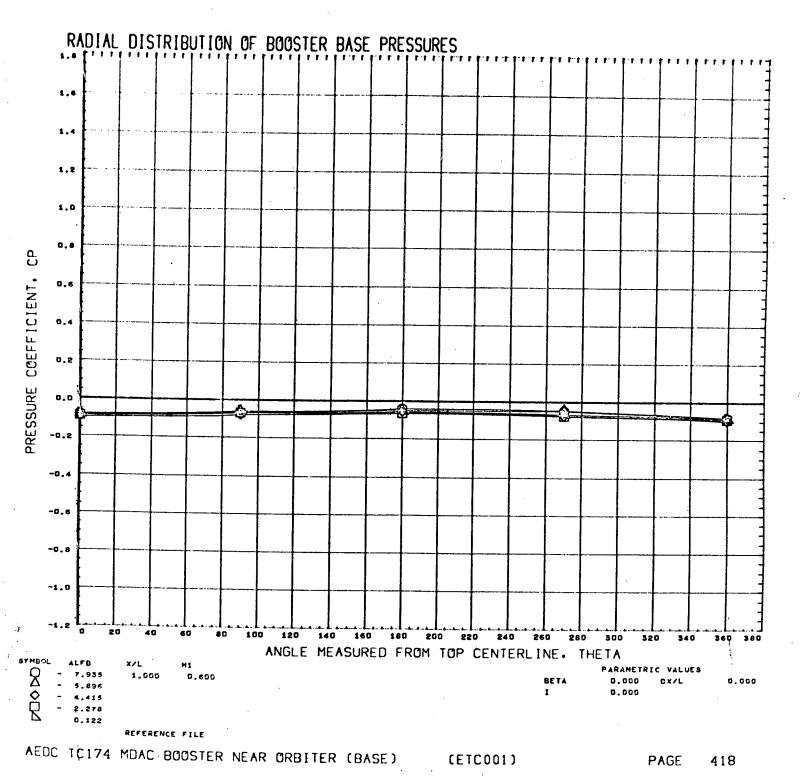
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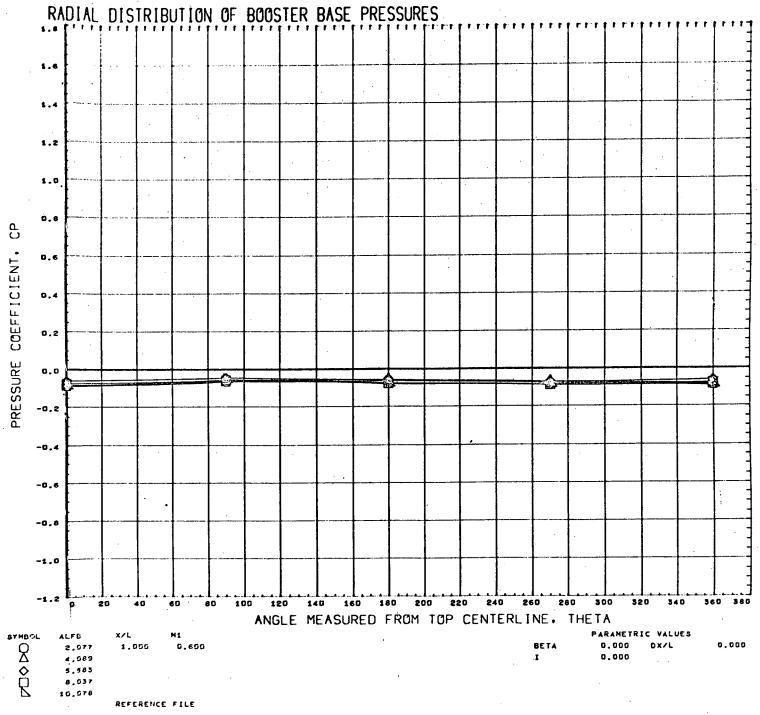


AEDC TC174 MDAC BOOSTER. CANARD OFF (BODY):

(ATC014)



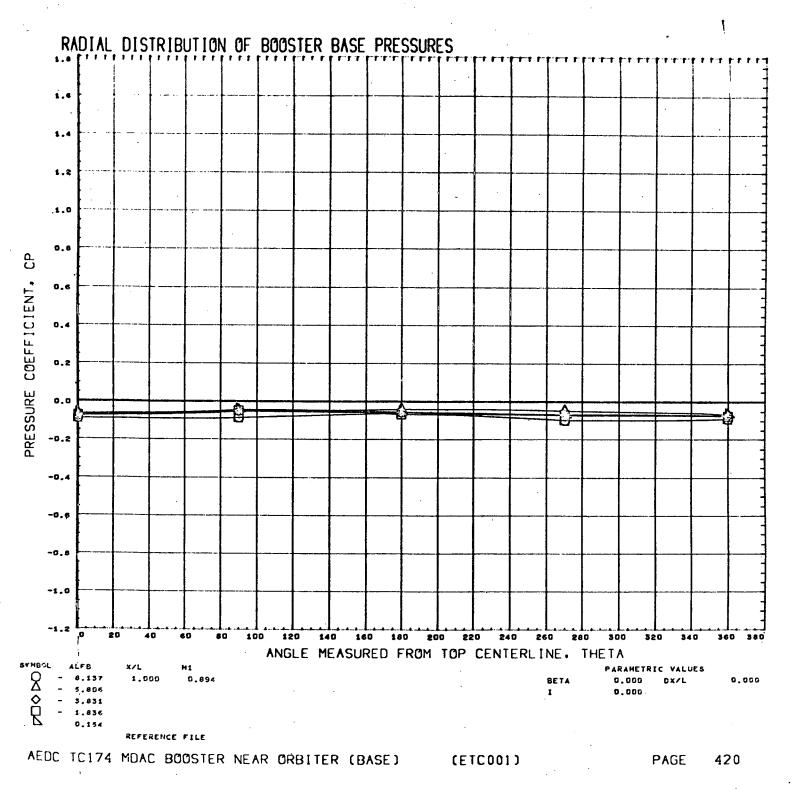


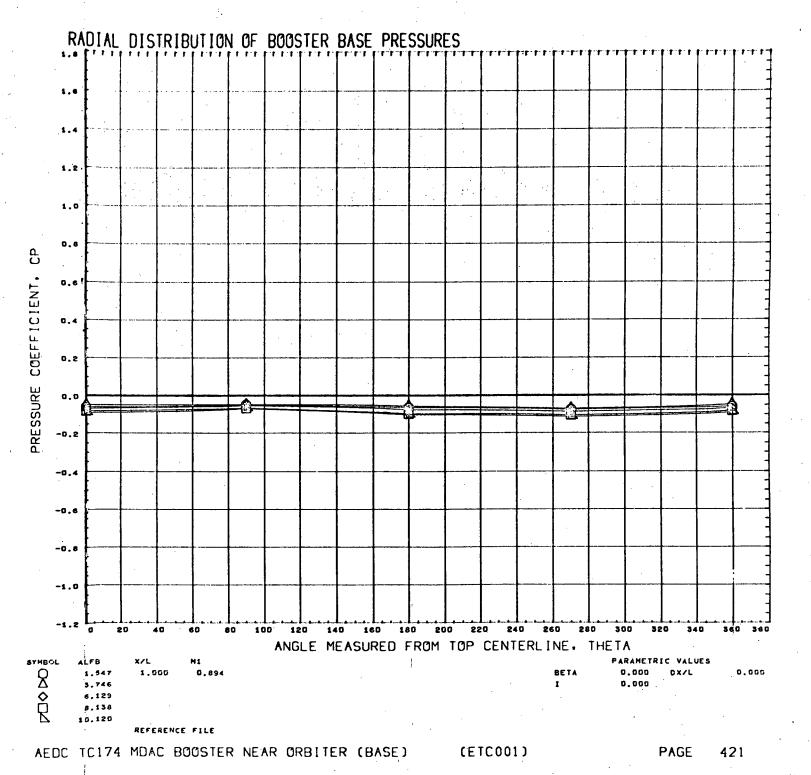


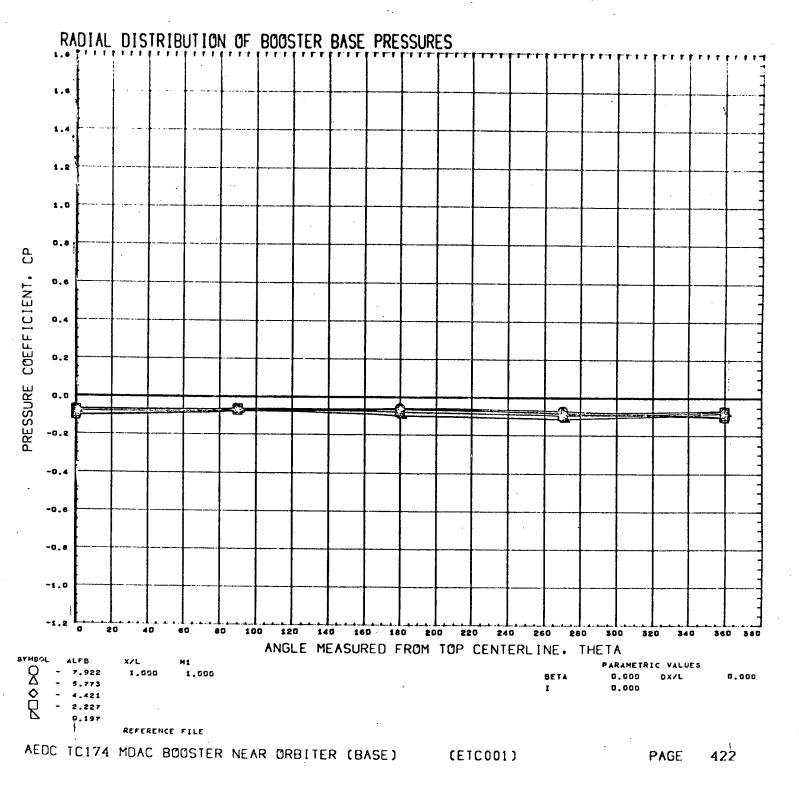
AEDC TÇ174 MDAC BOOSTER NEAR ORBITER (BASE)

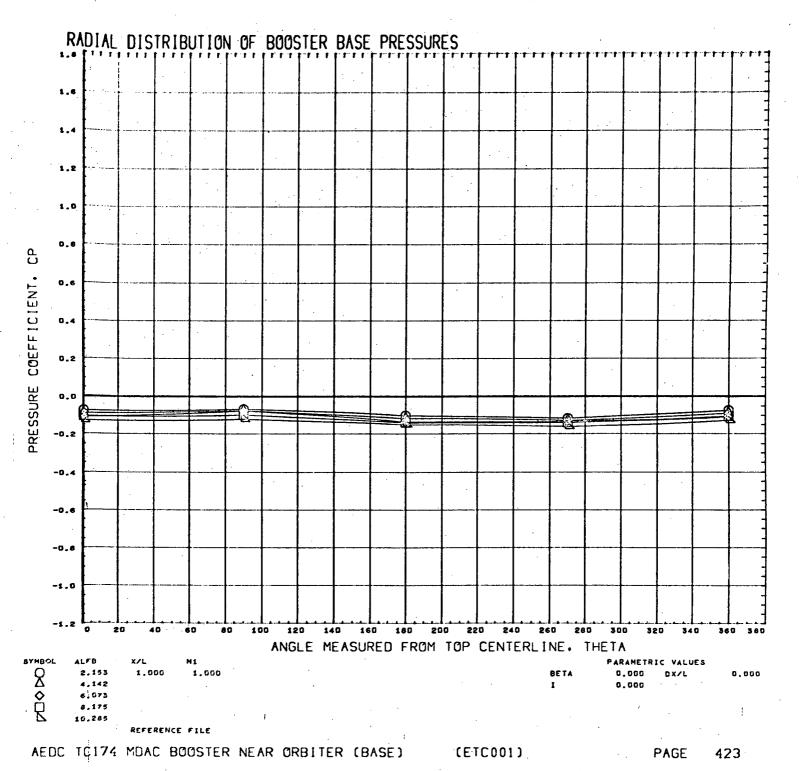
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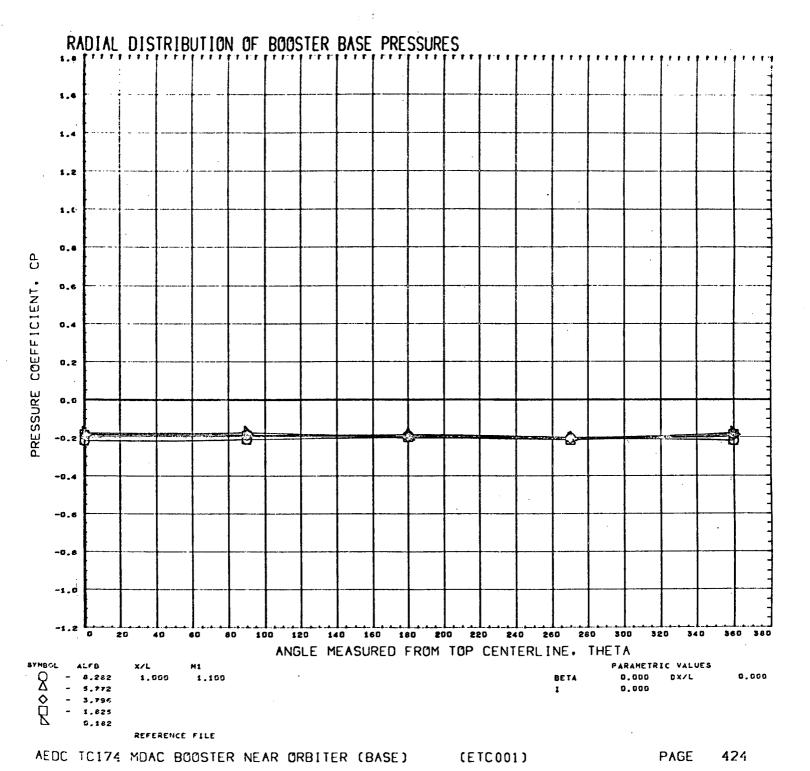
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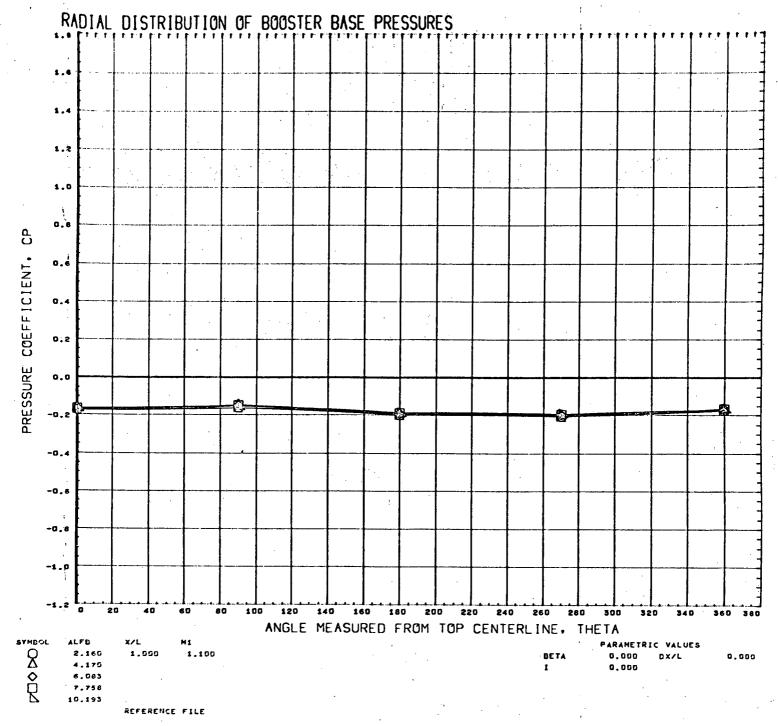








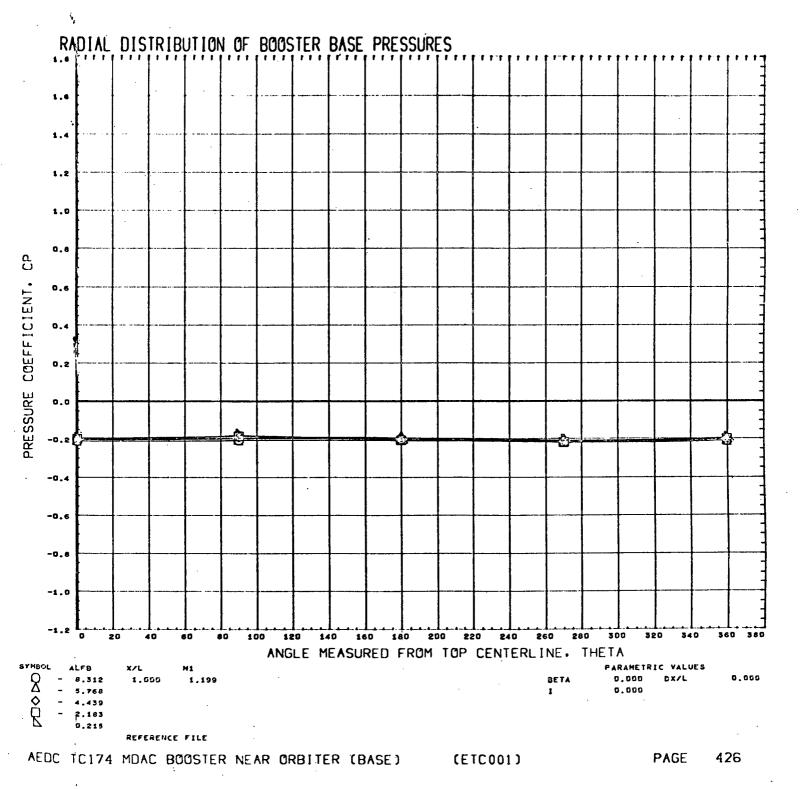


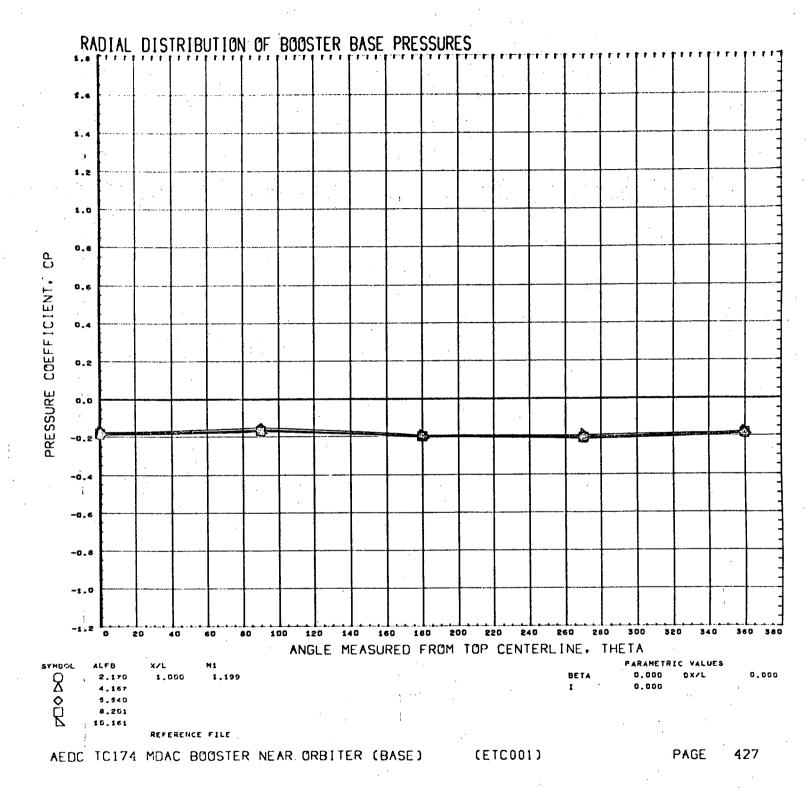


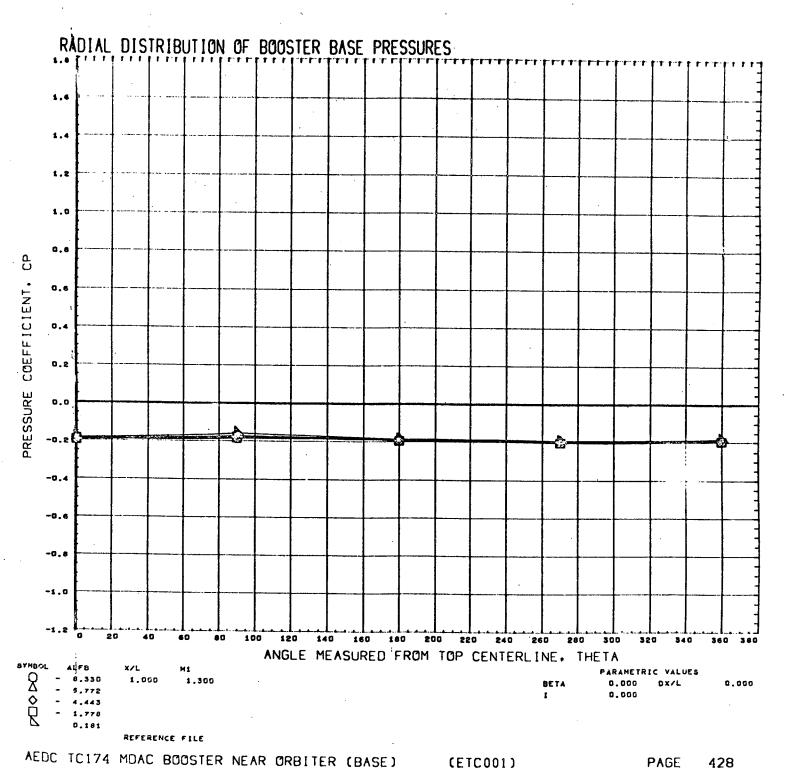
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

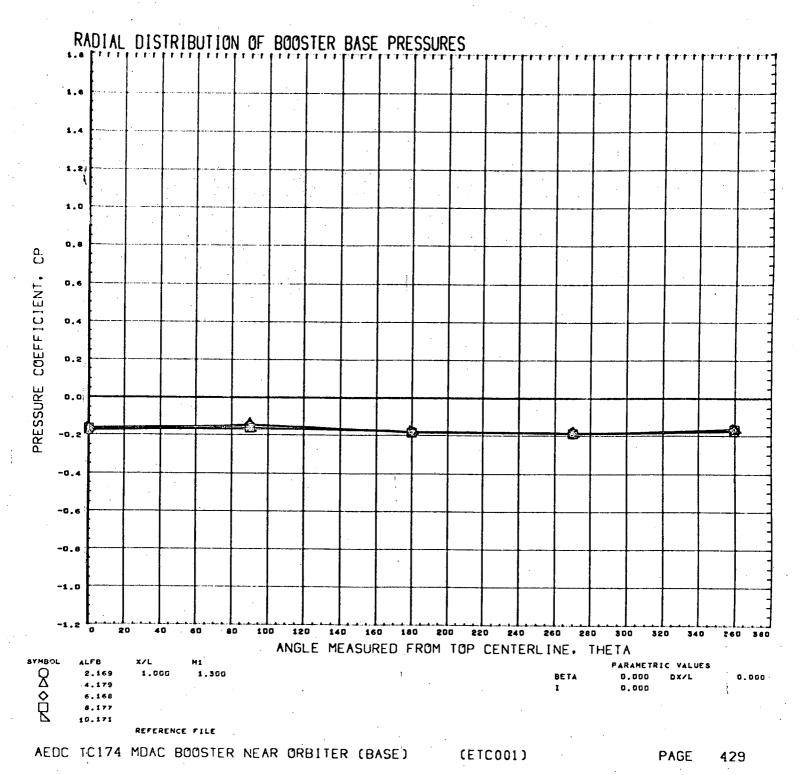
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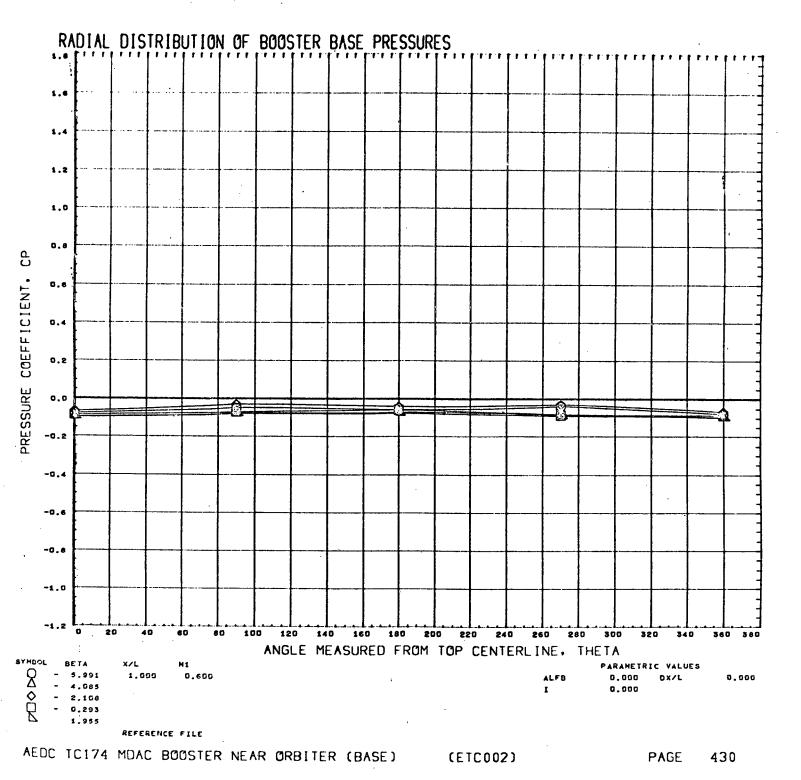
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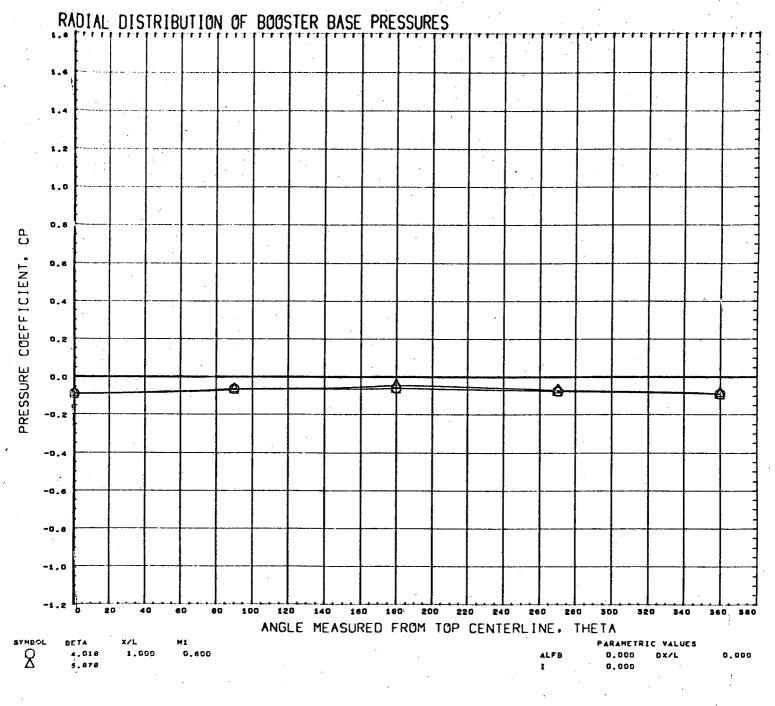








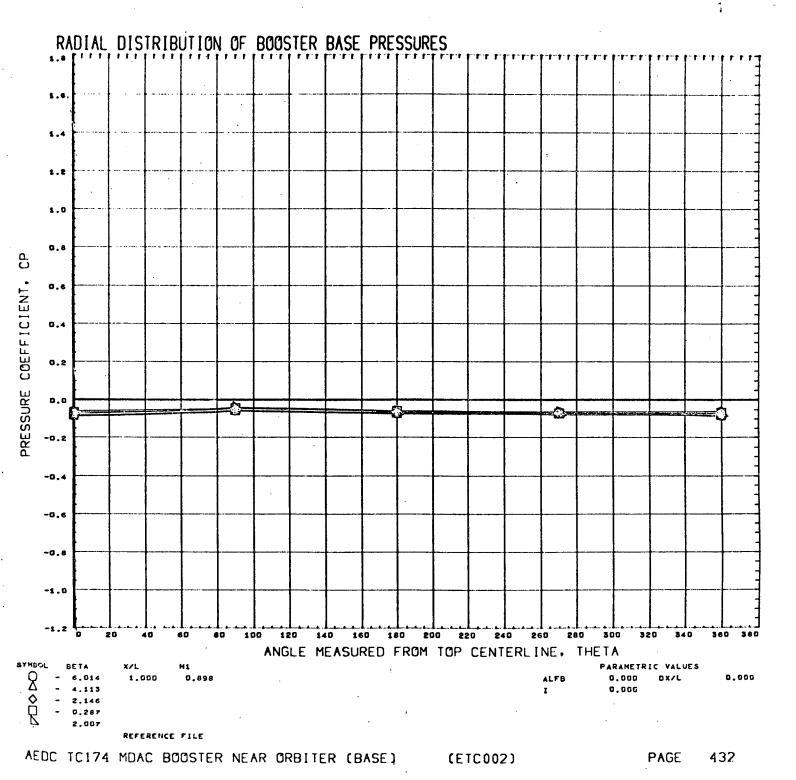


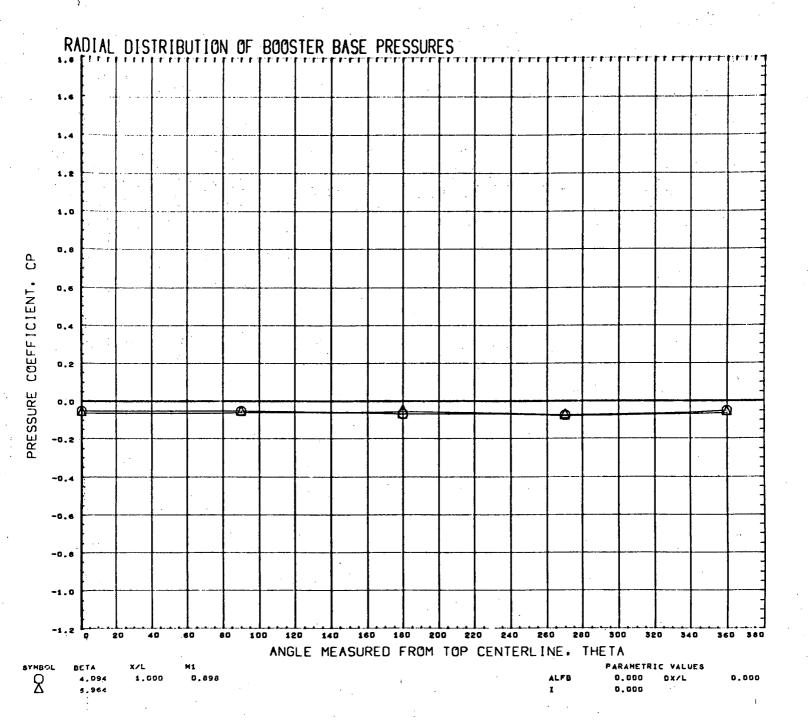


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC002)

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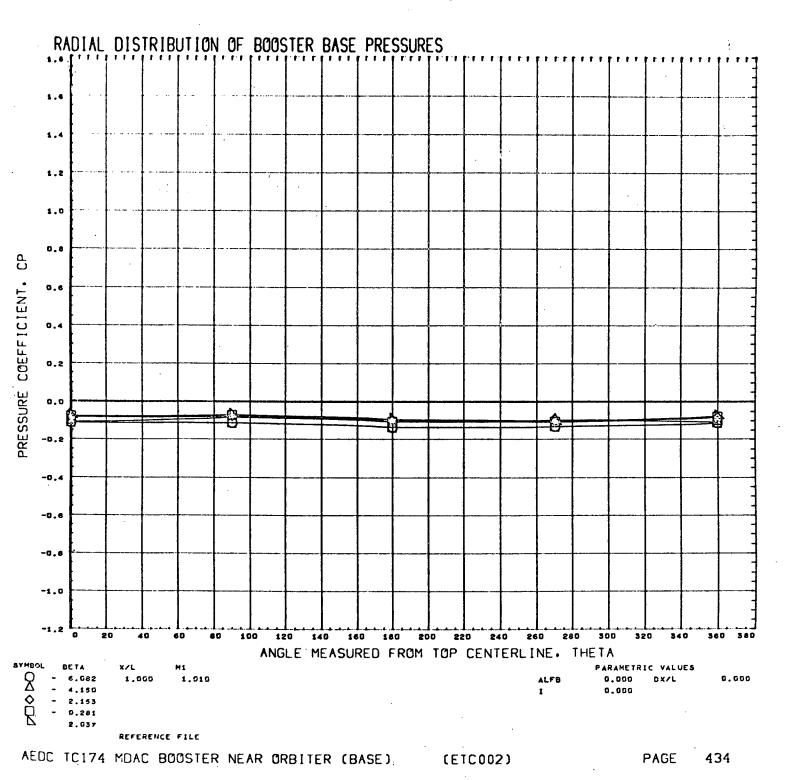


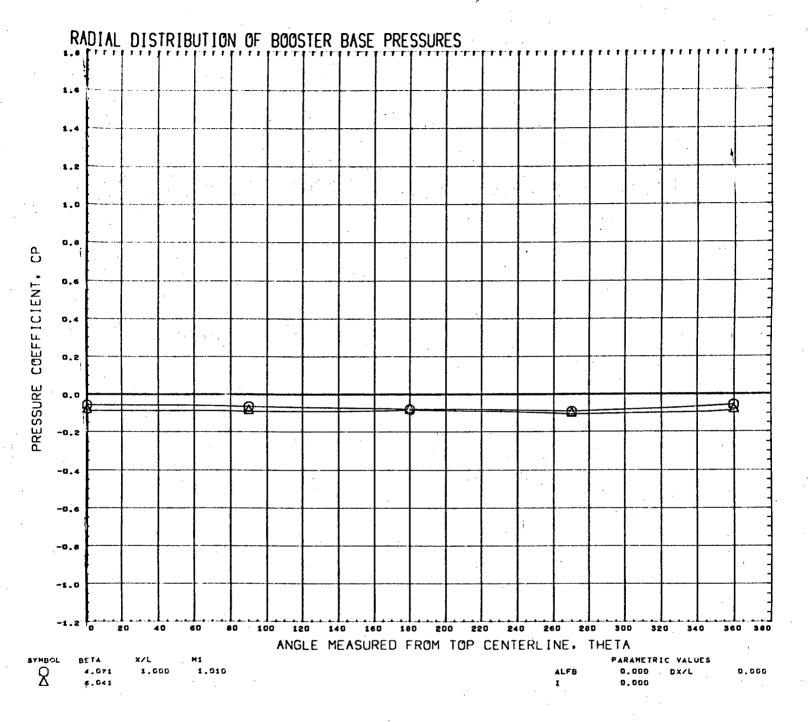


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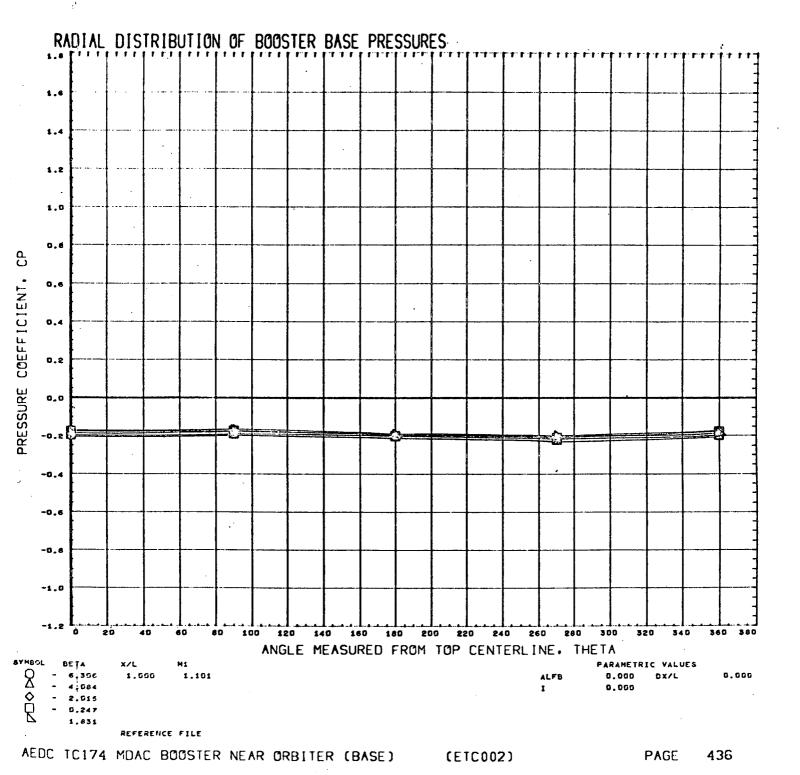
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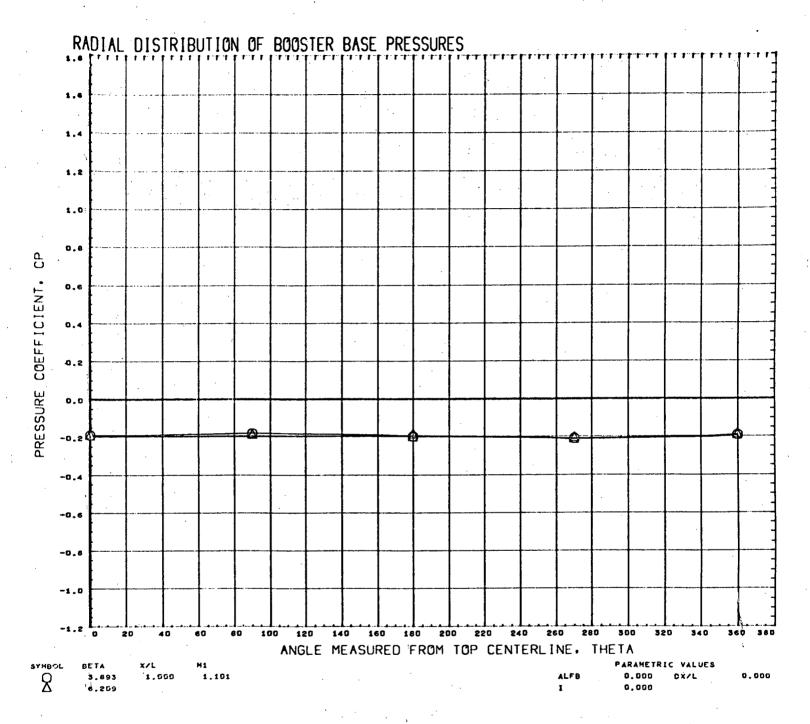




AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE) (ETC002)

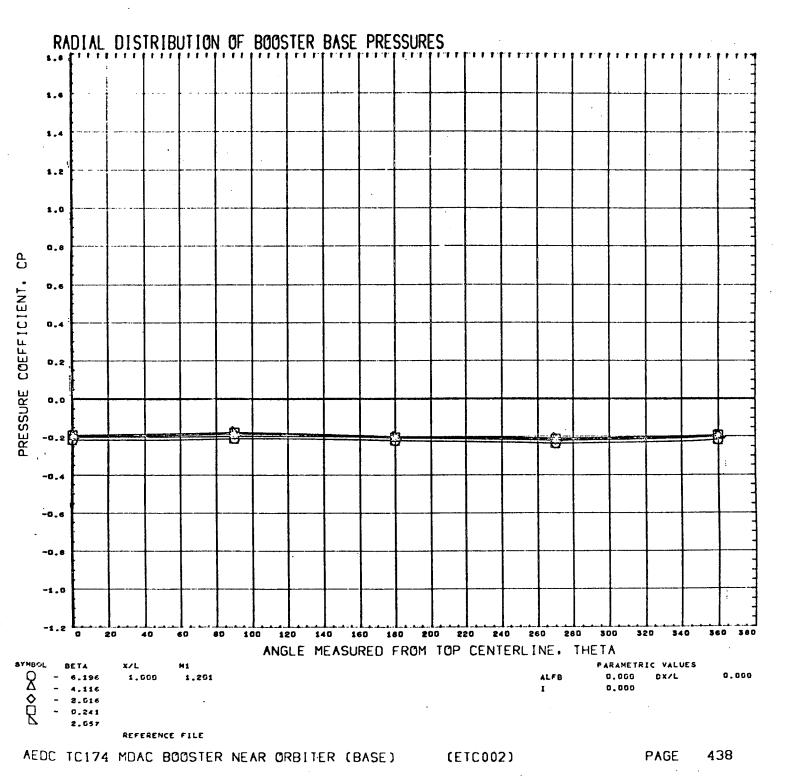


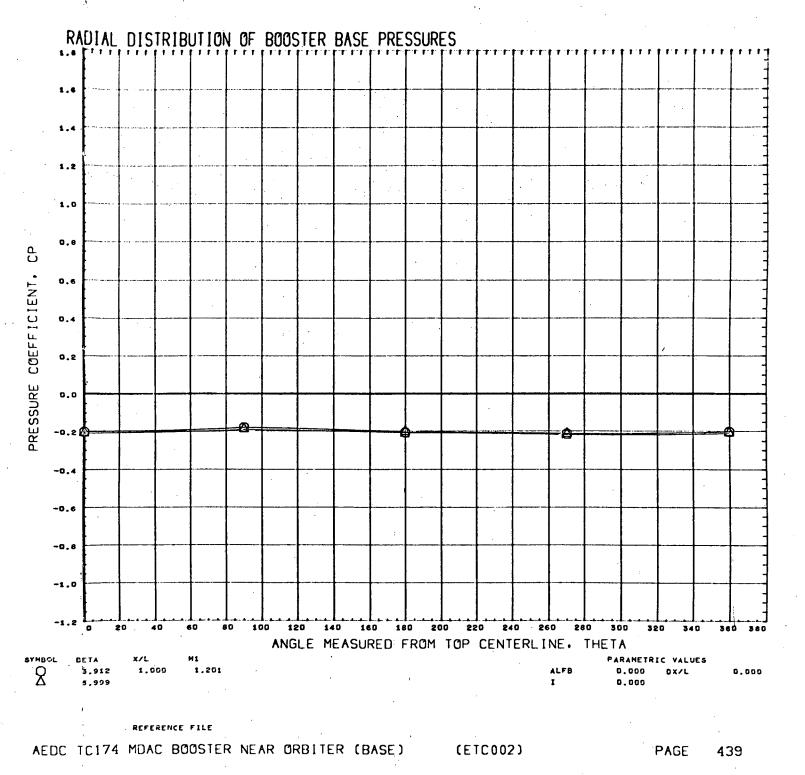
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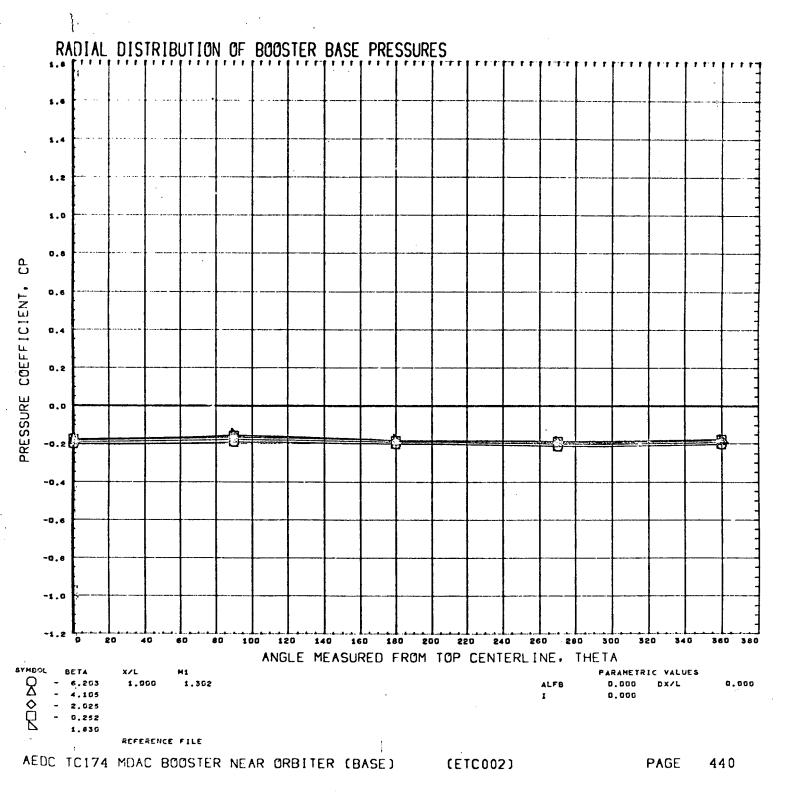


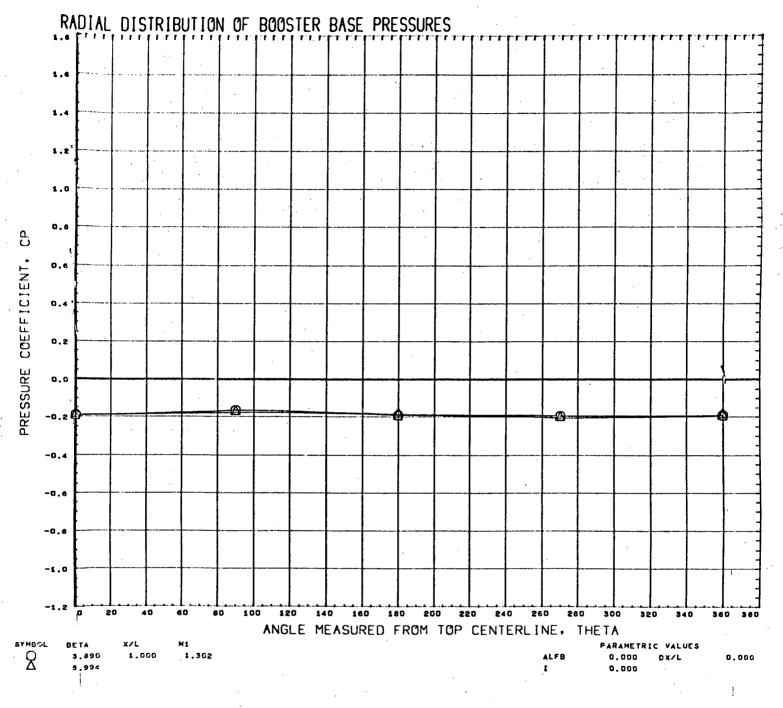
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC002)



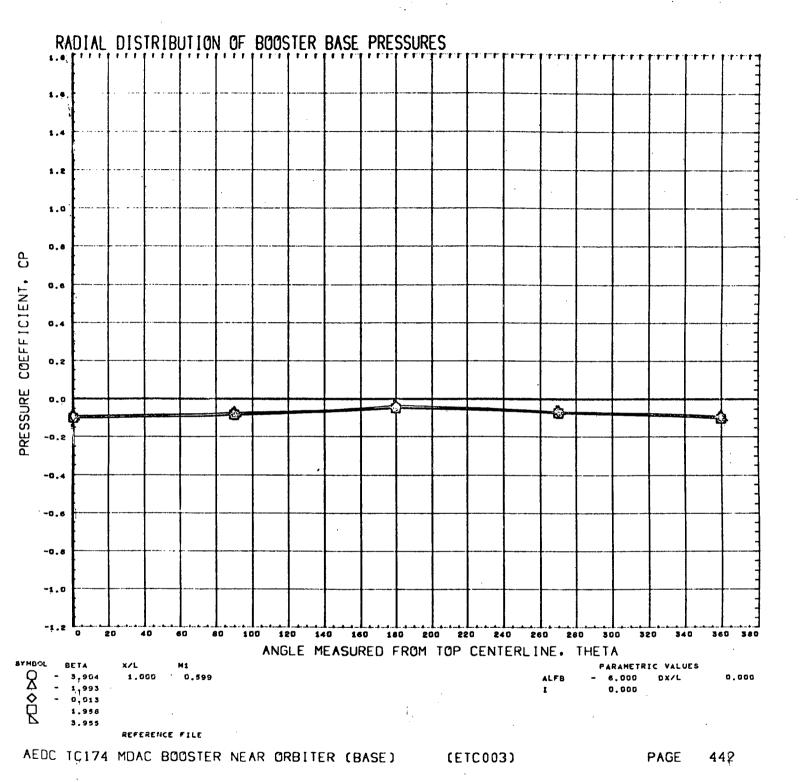


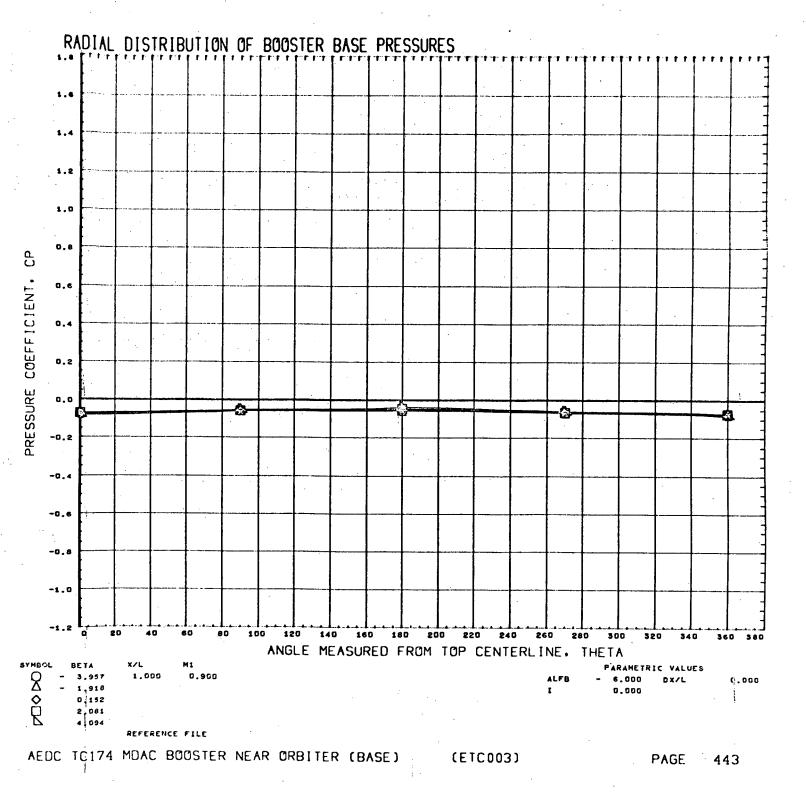


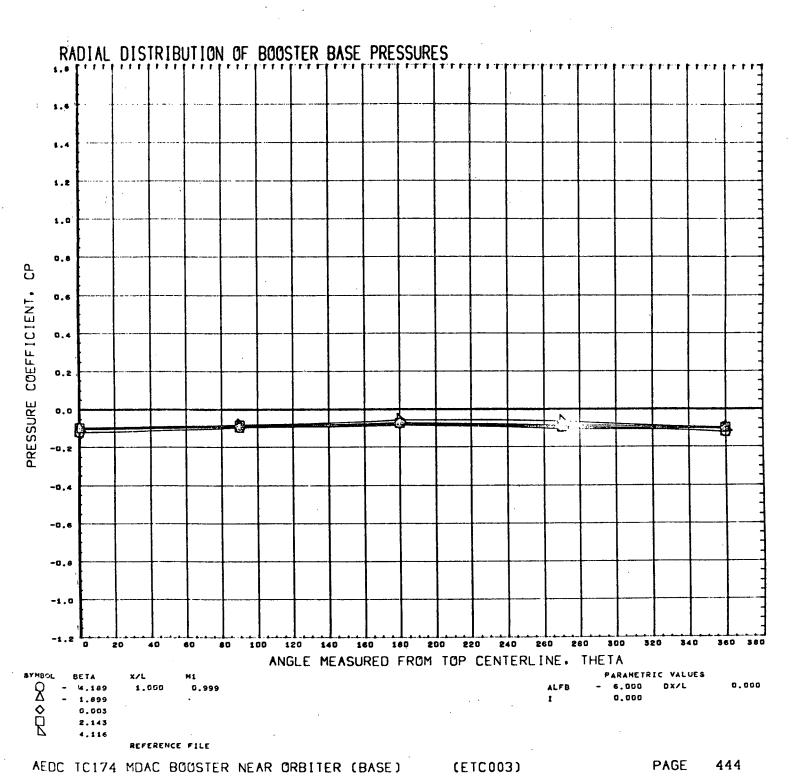


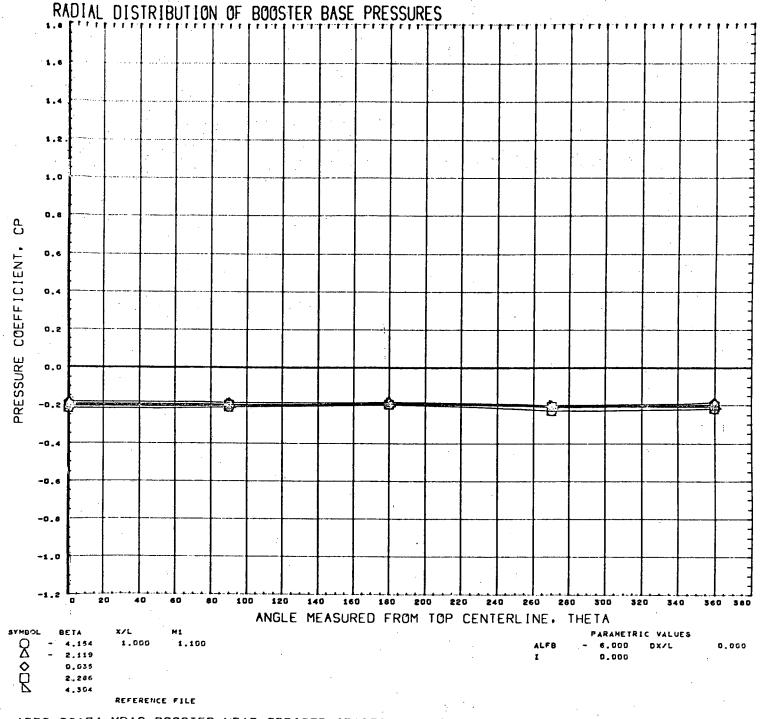
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

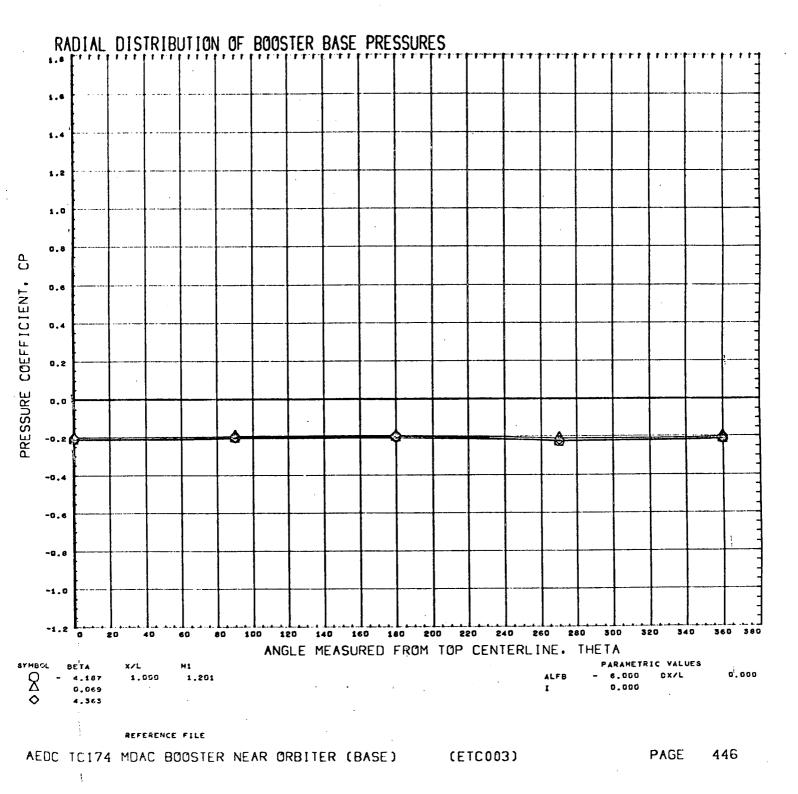
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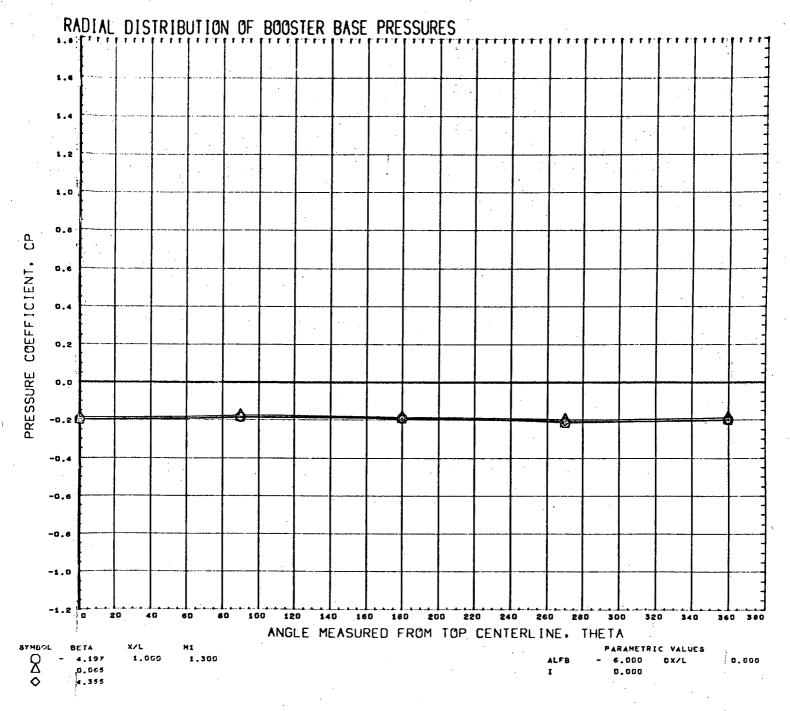






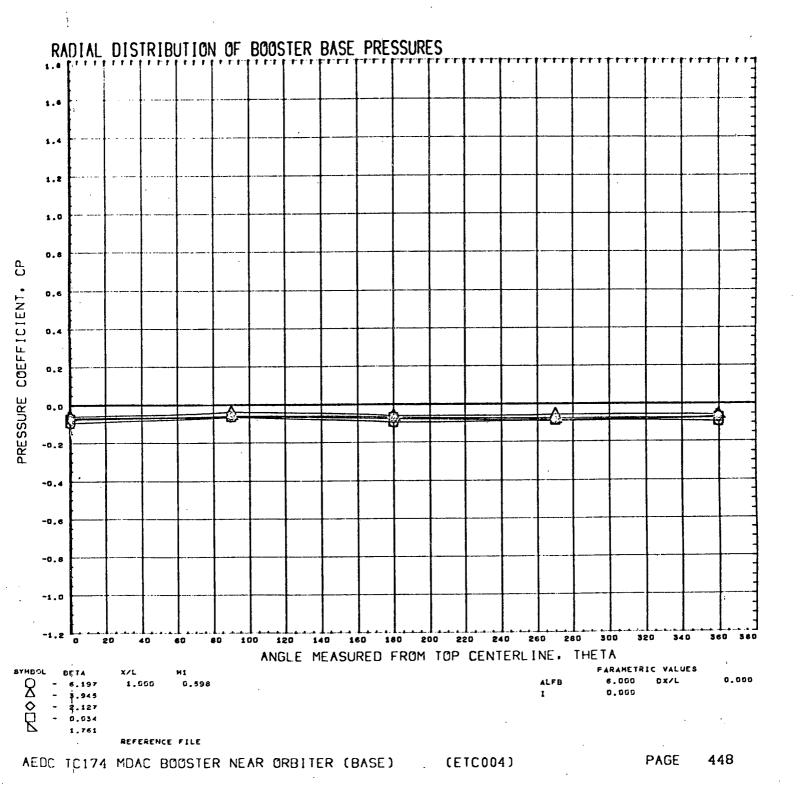


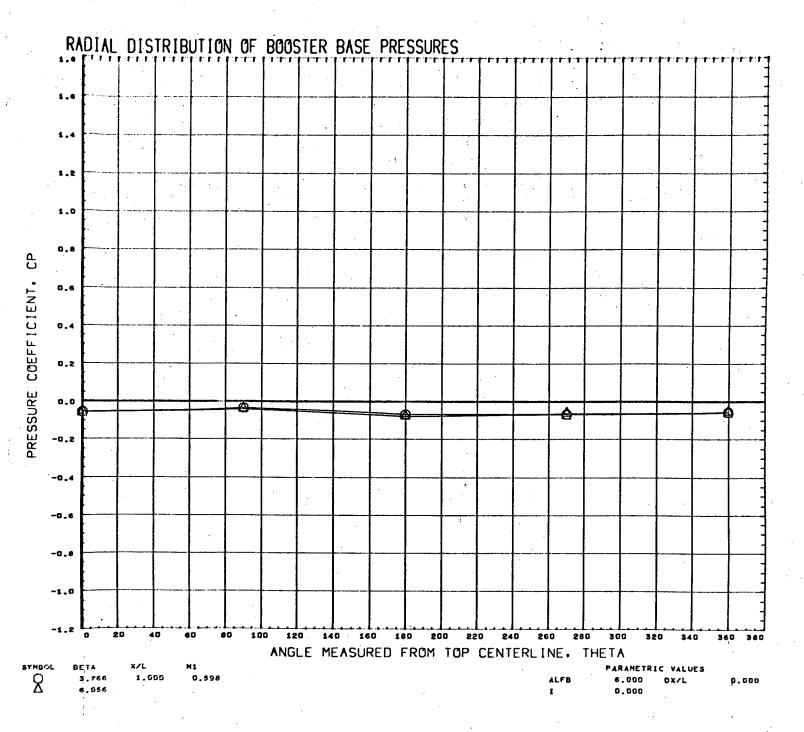




AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE) (8

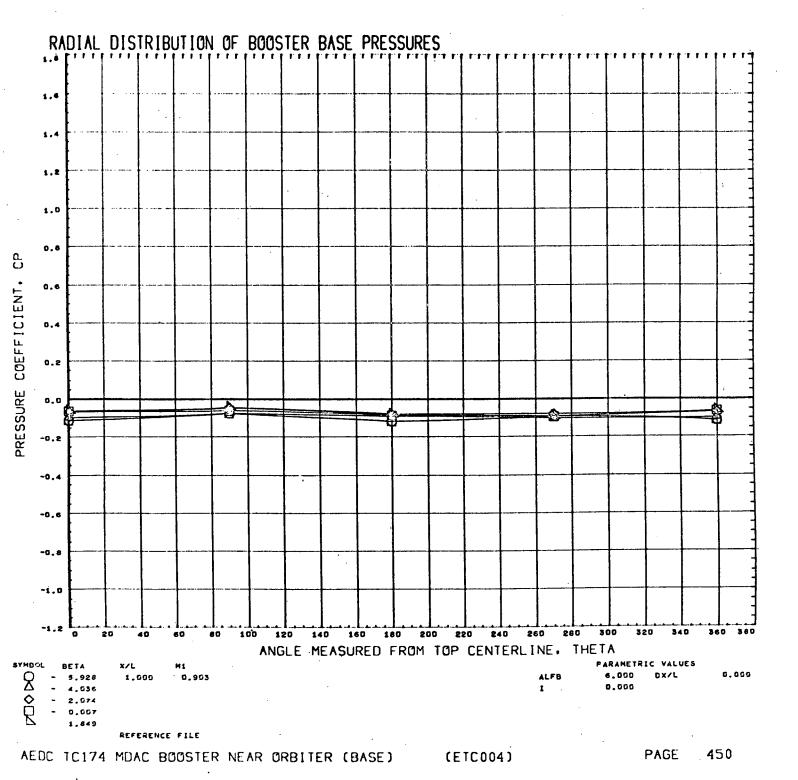
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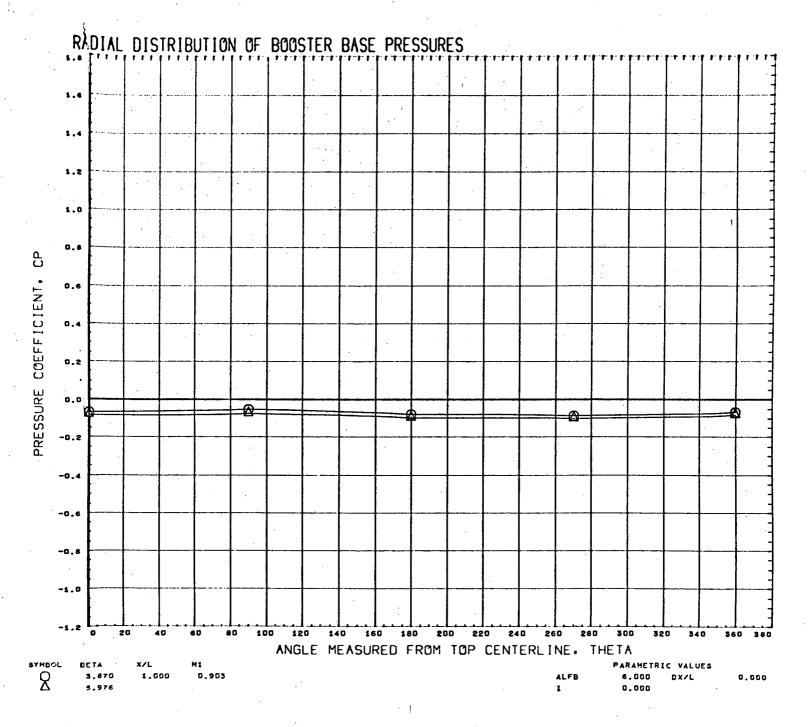


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC004)

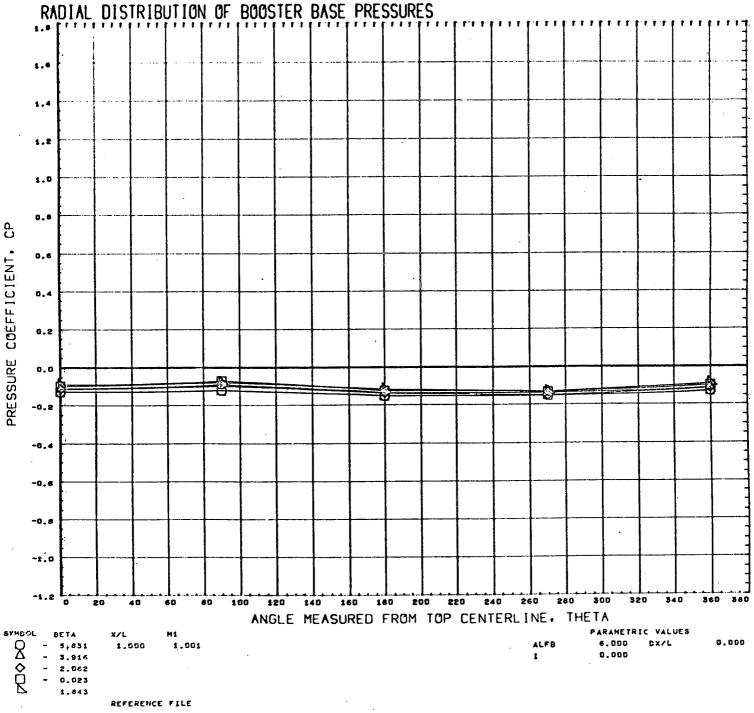


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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC004)



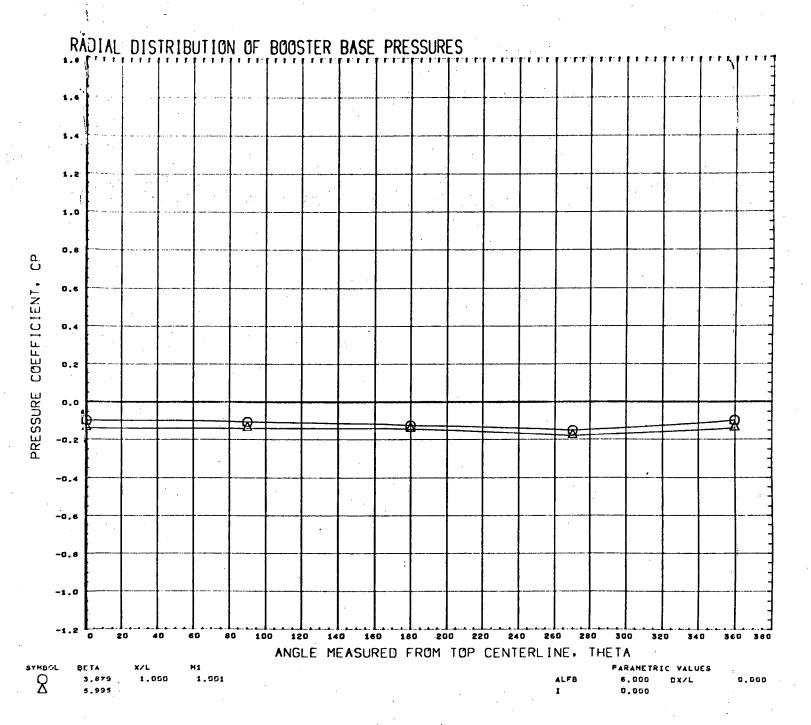
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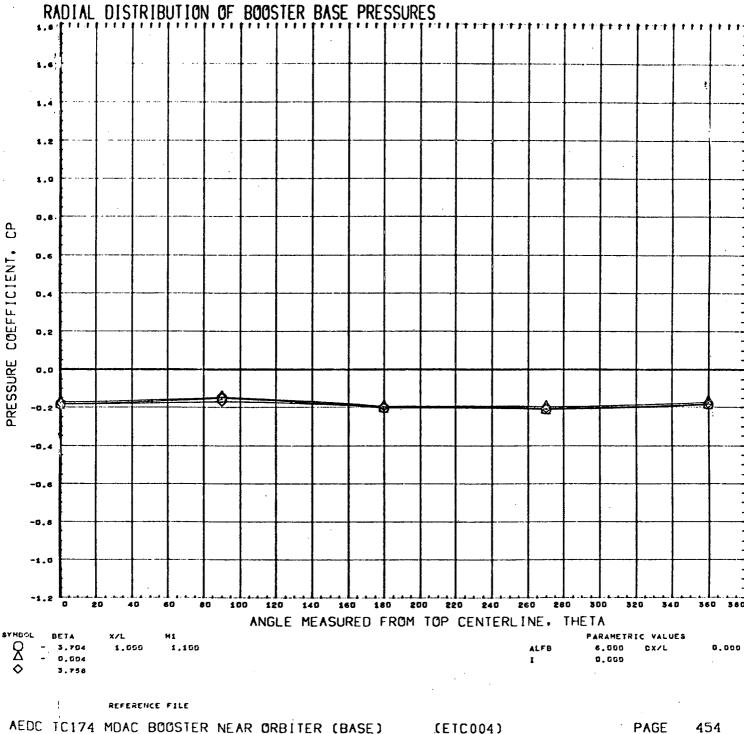
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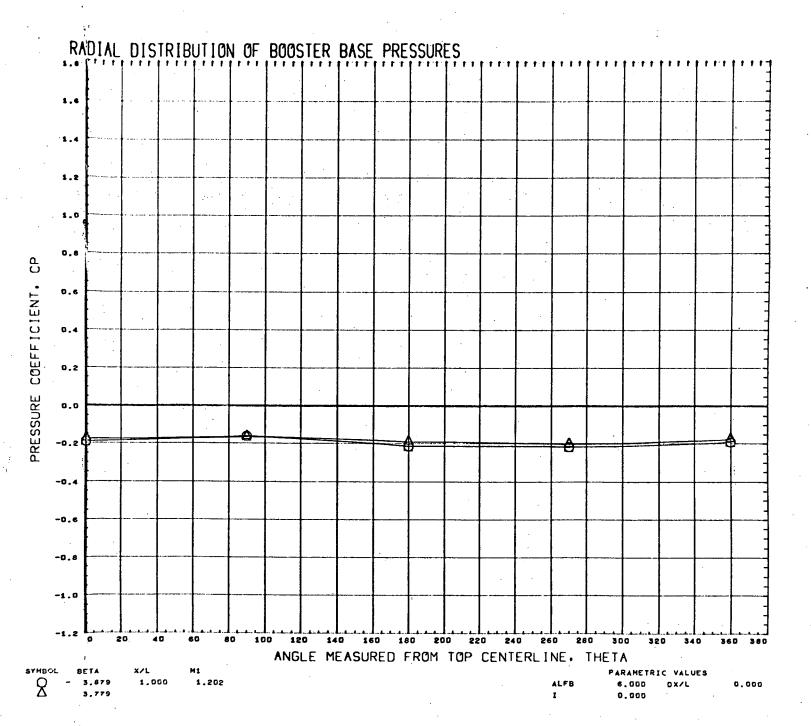
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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETCOO4)



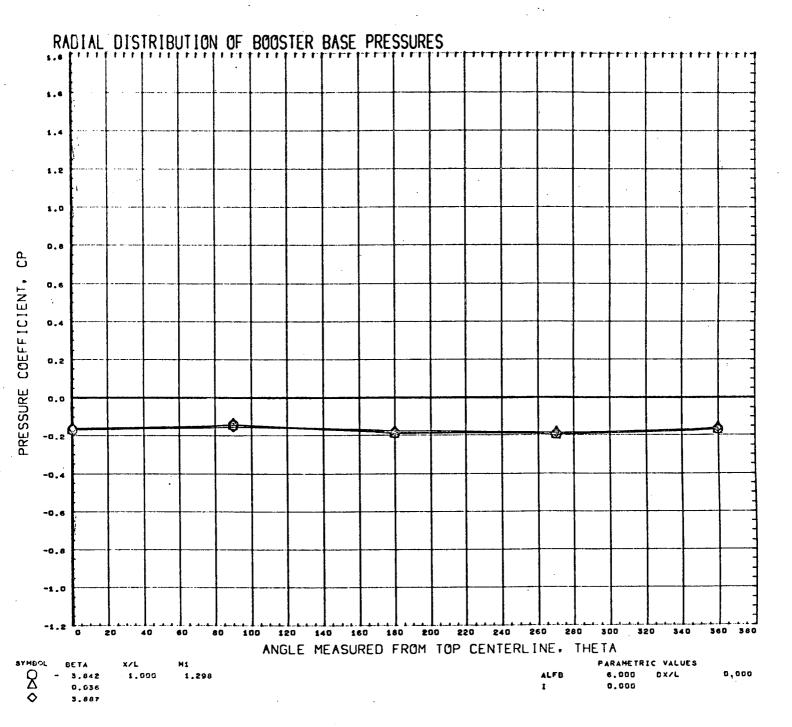


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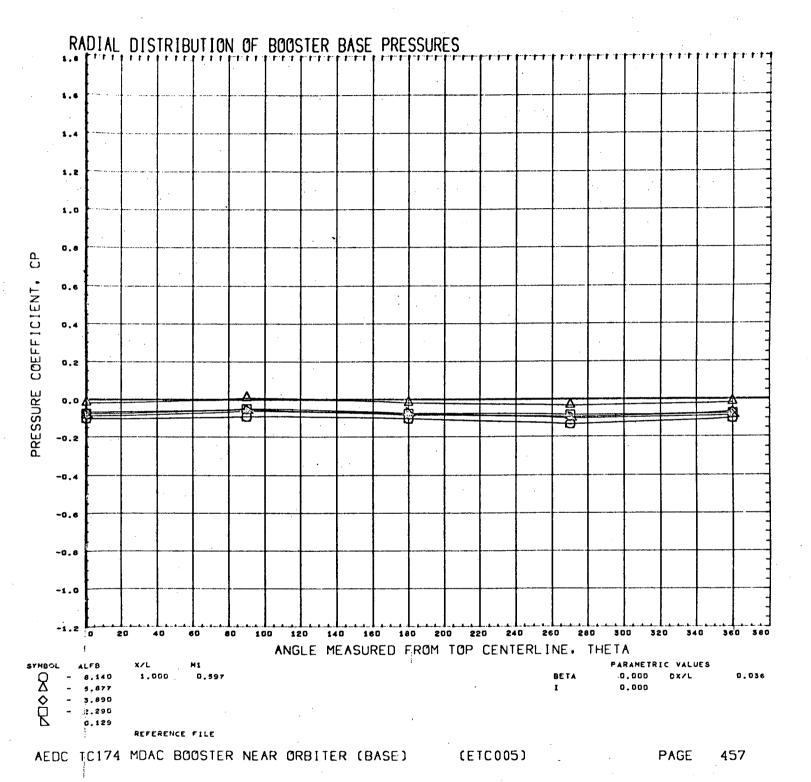
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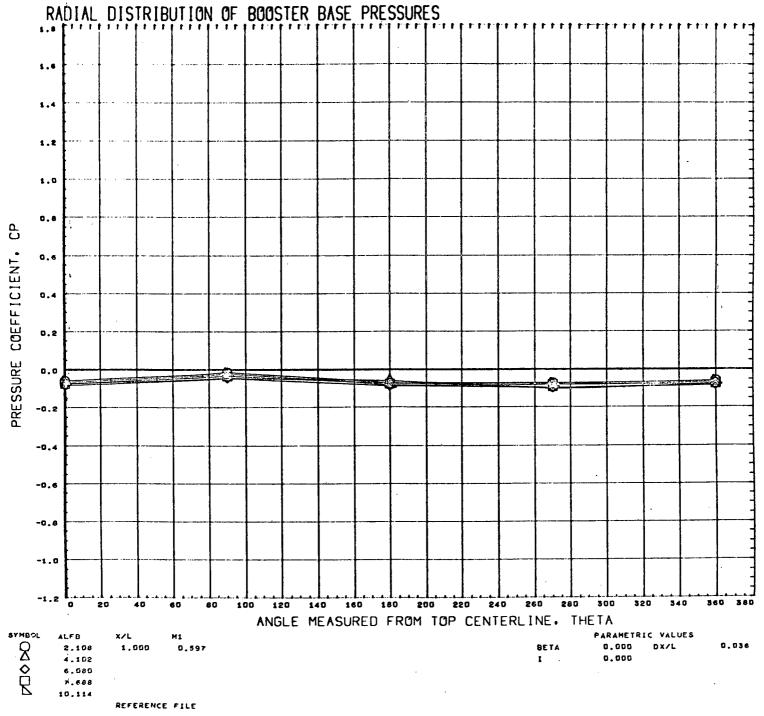
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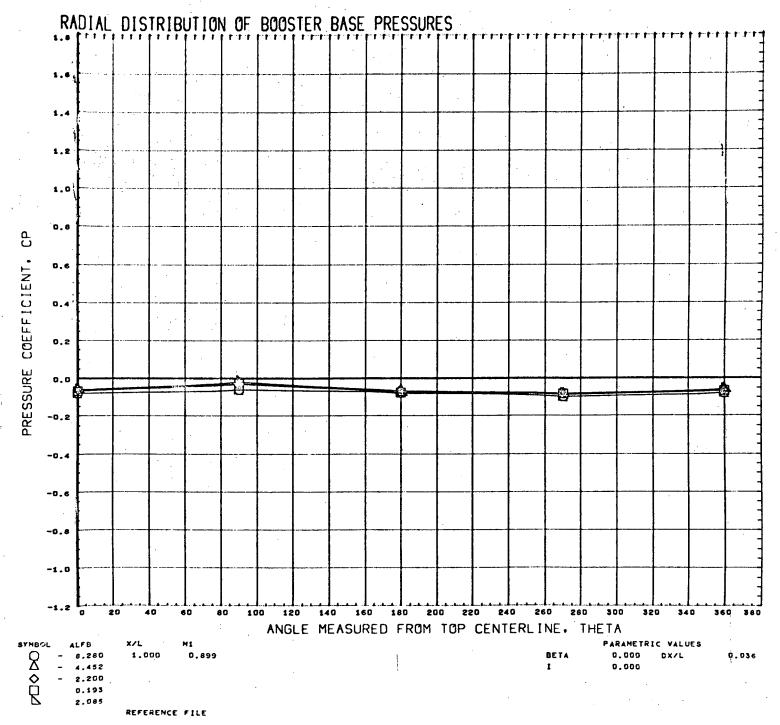


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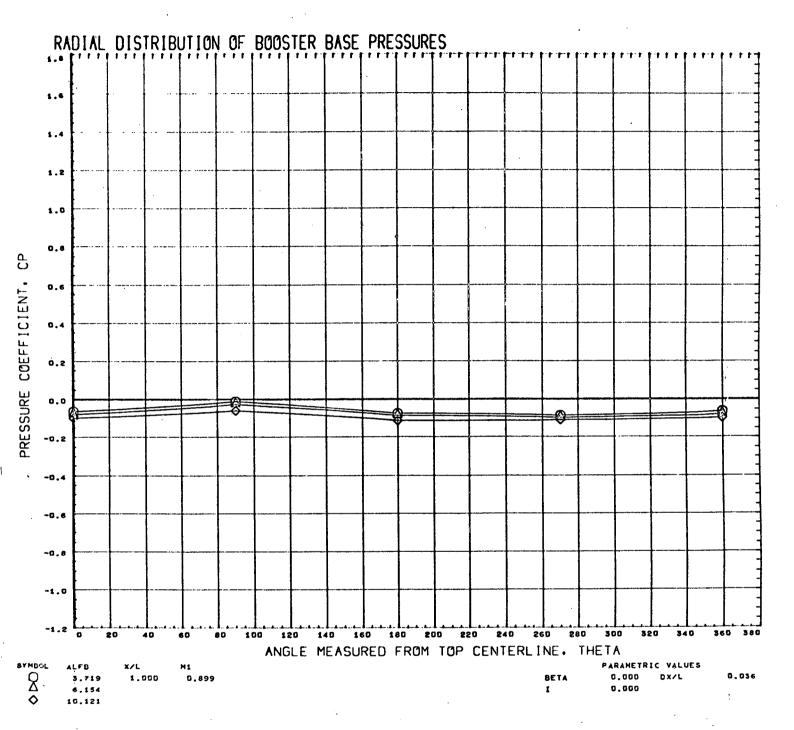




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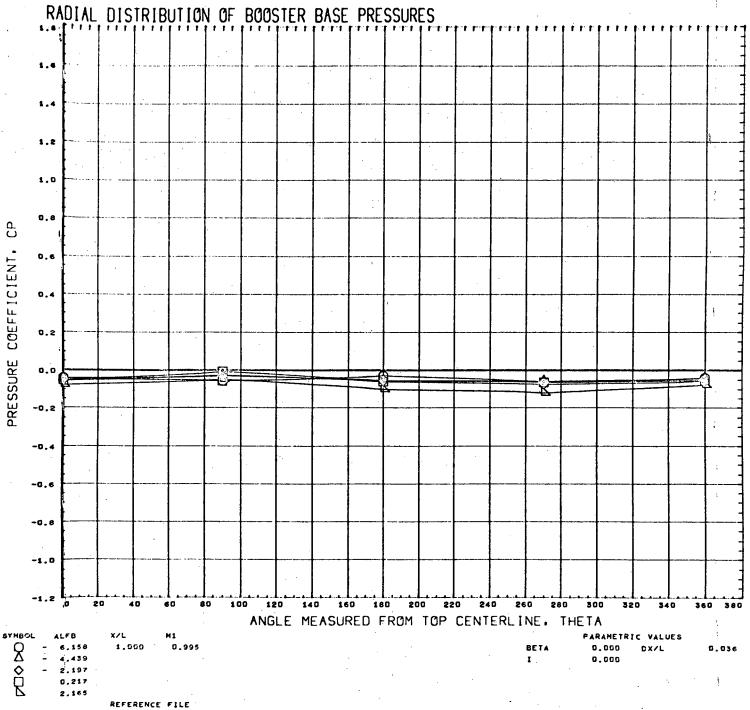


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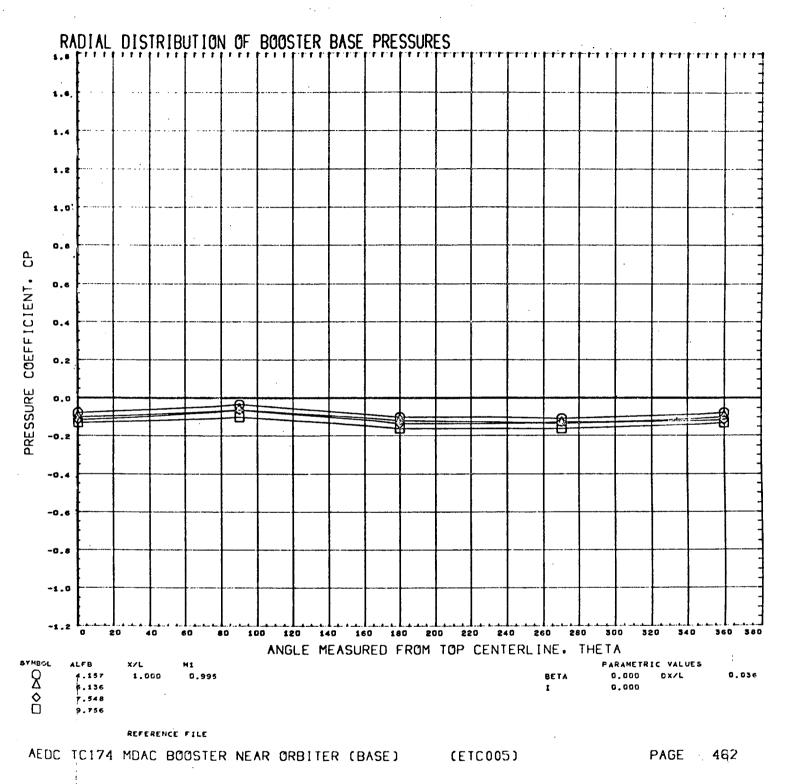


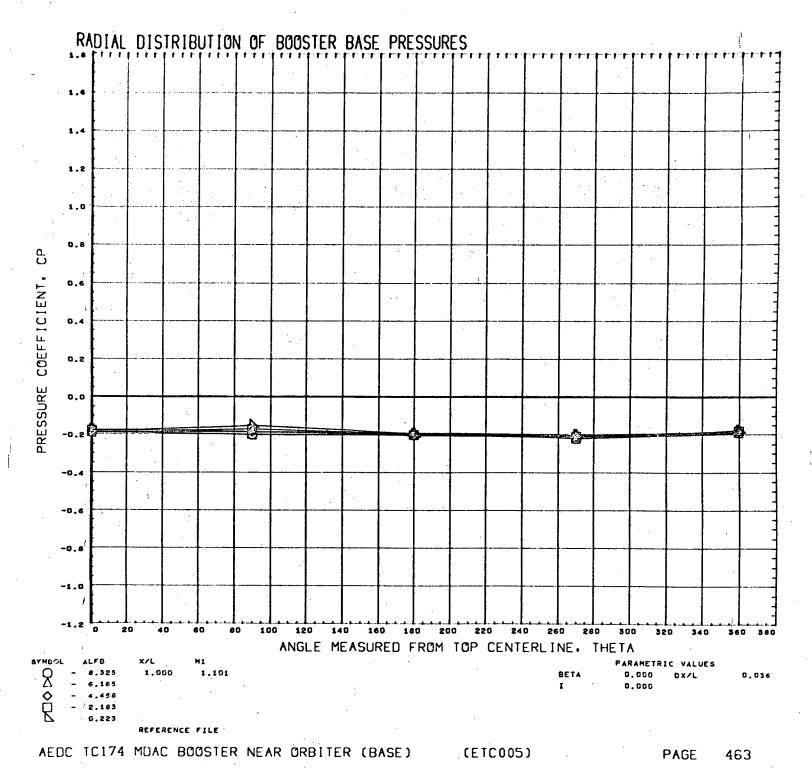
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

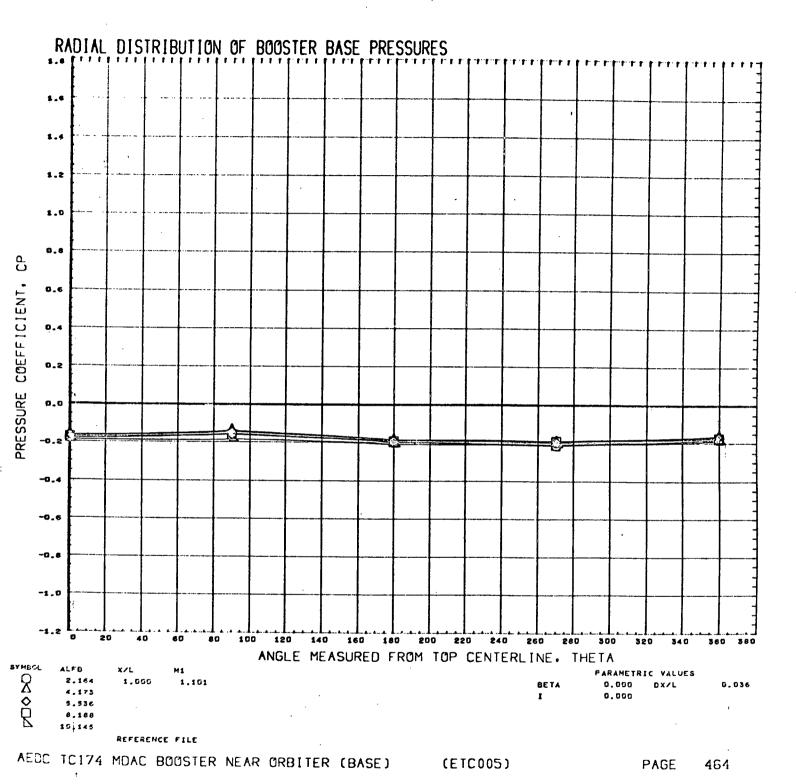
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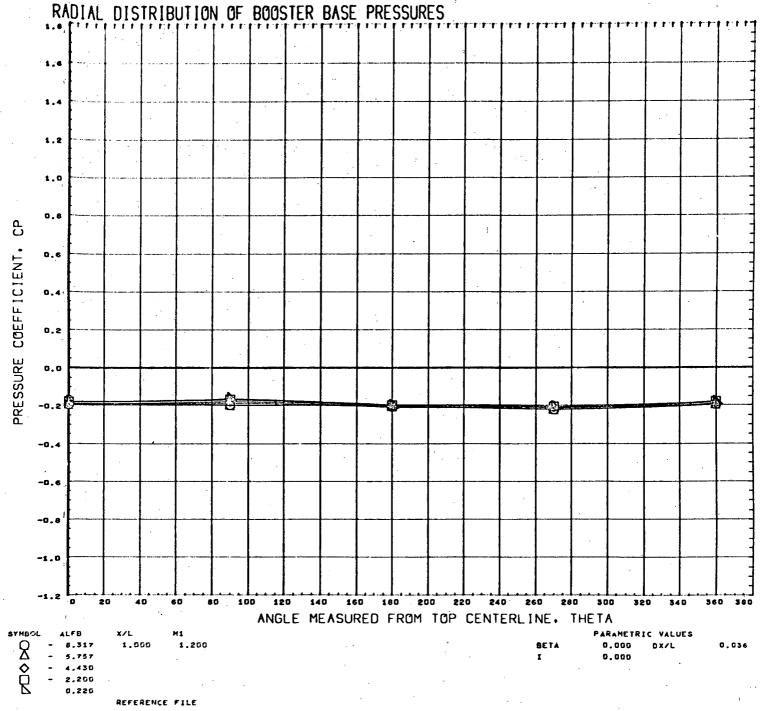


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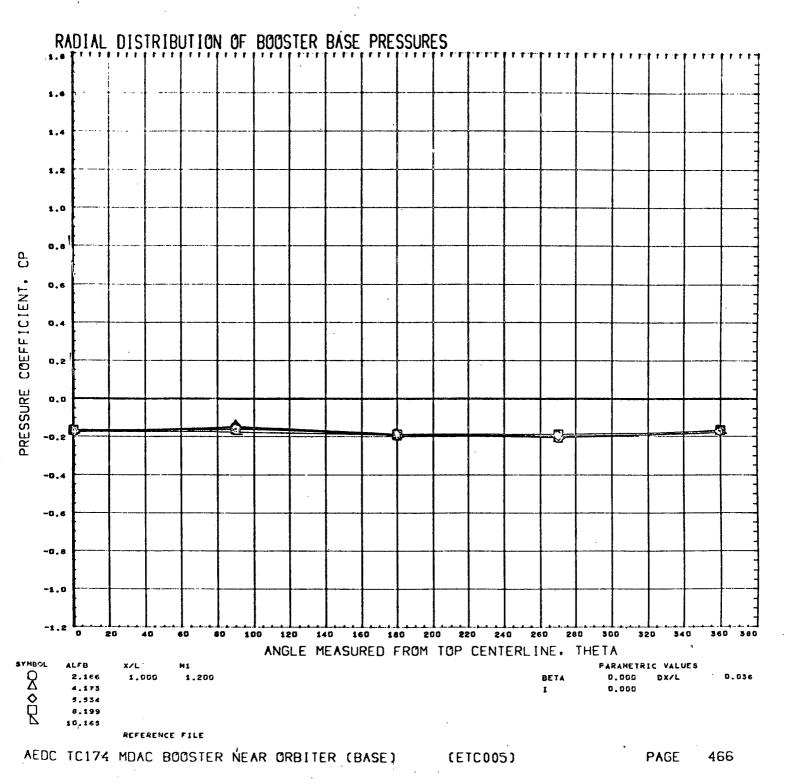


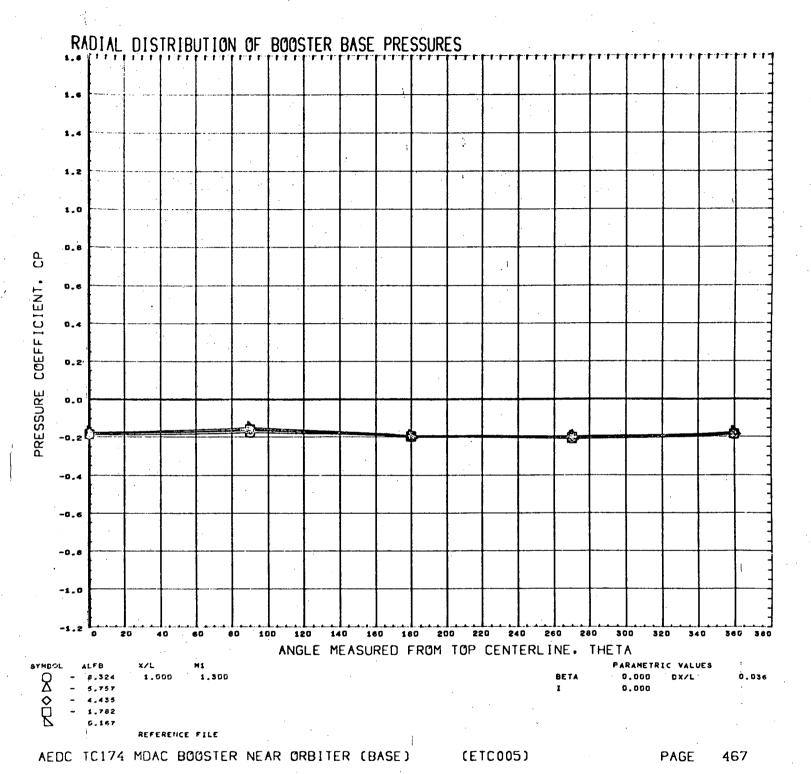


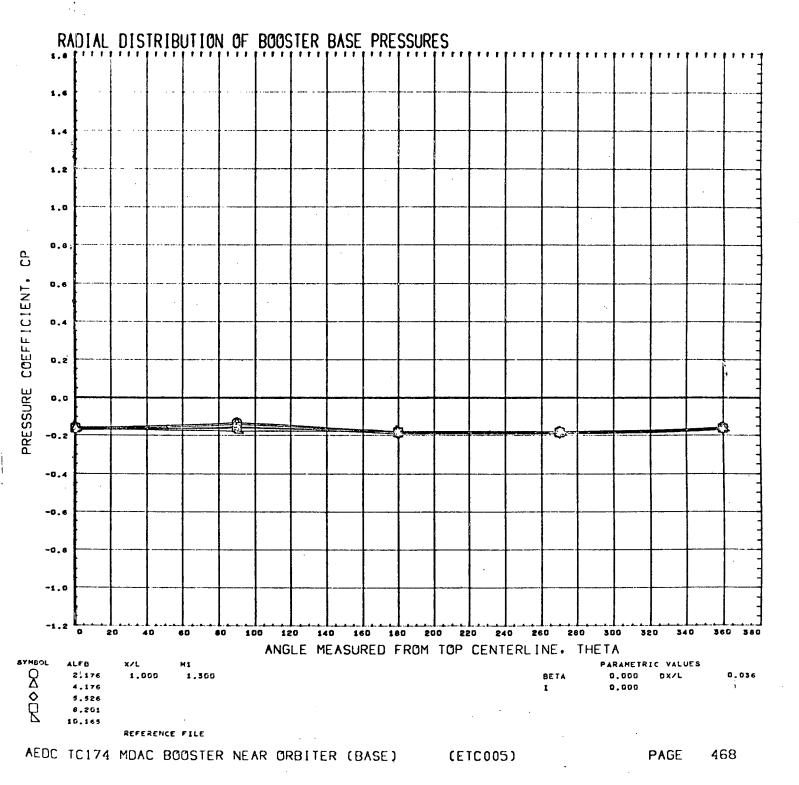


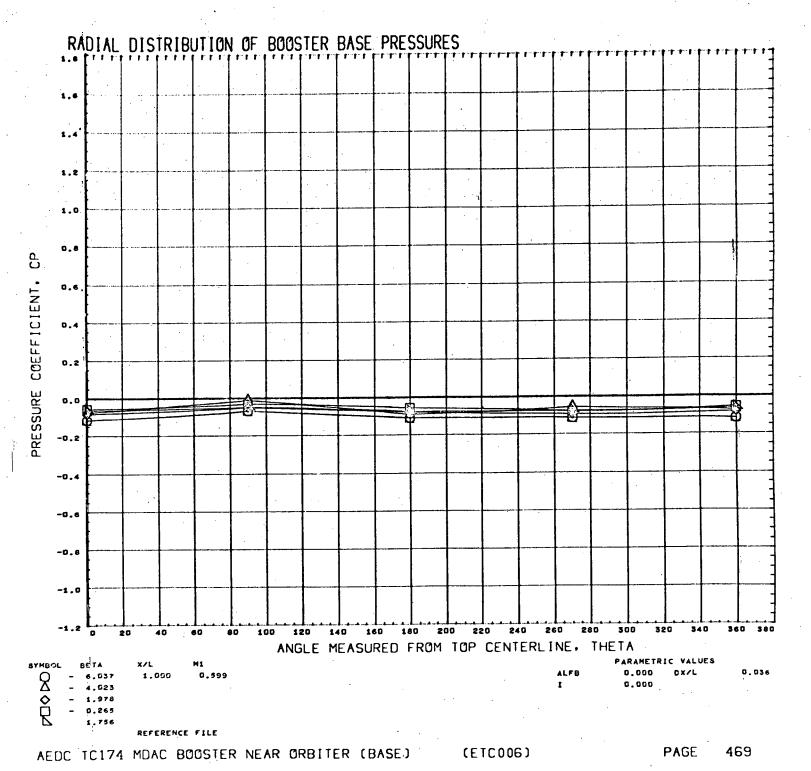


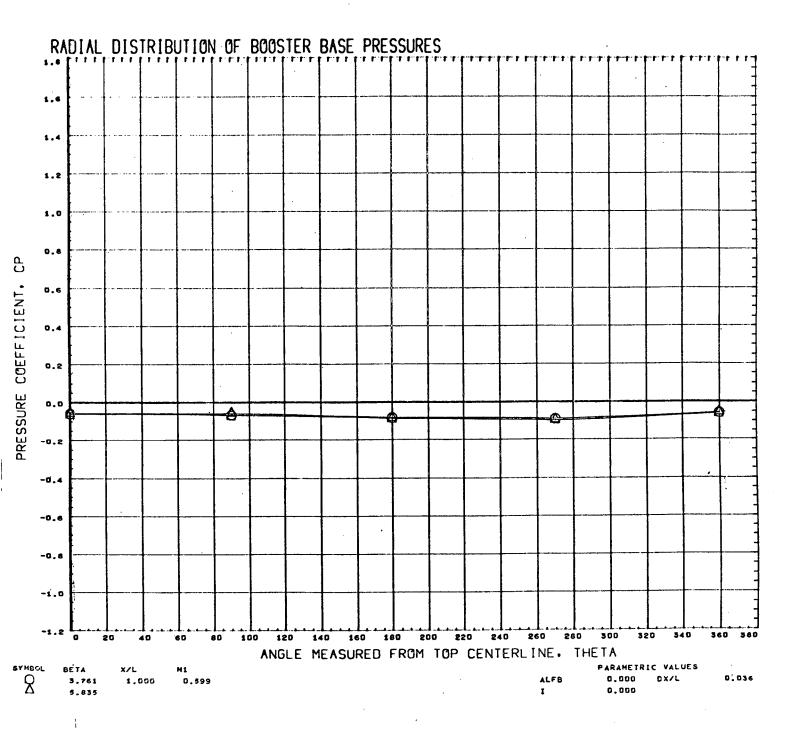
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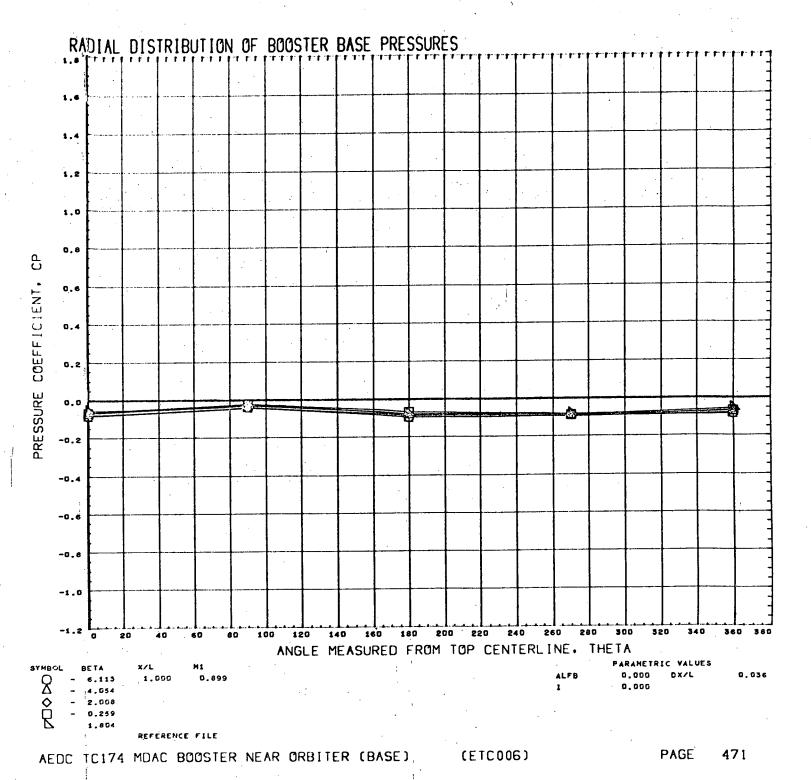


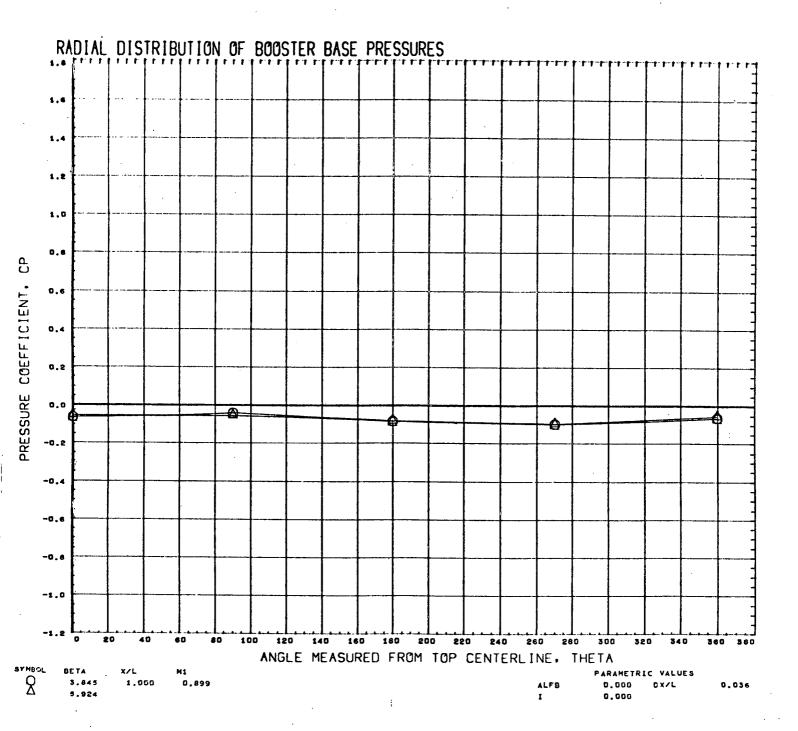




AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC006)



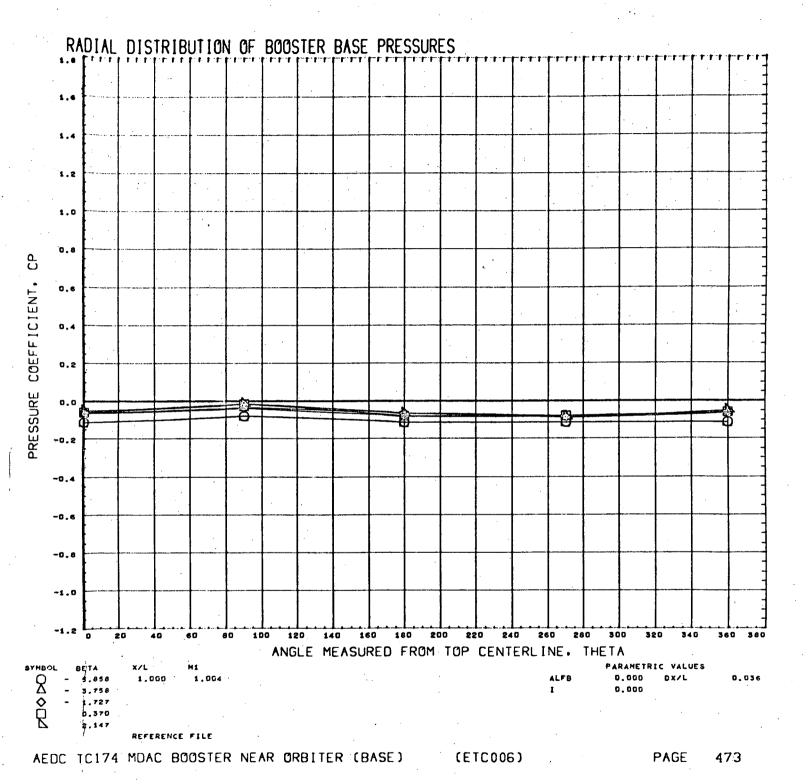


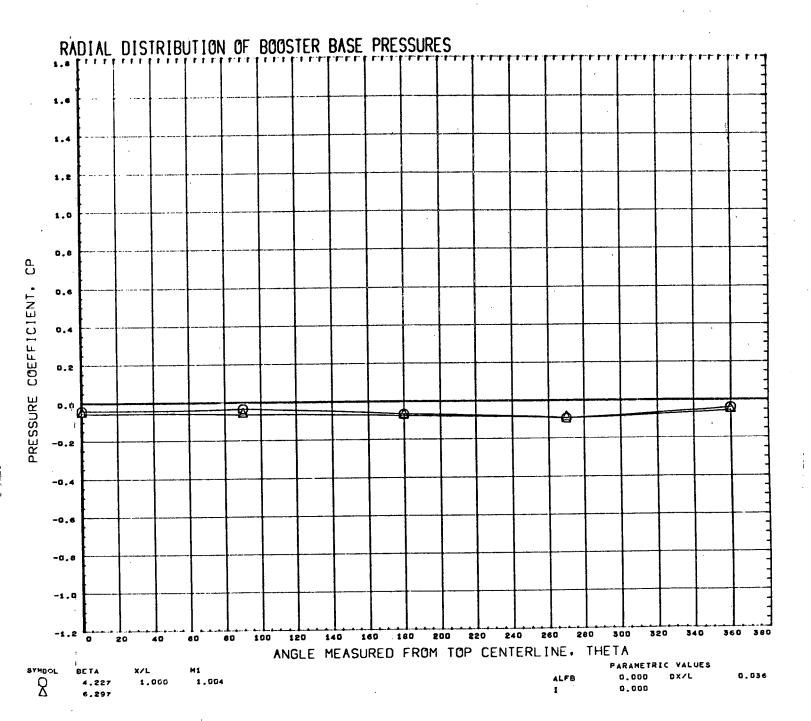
AEDC TÇ174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC006)

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472

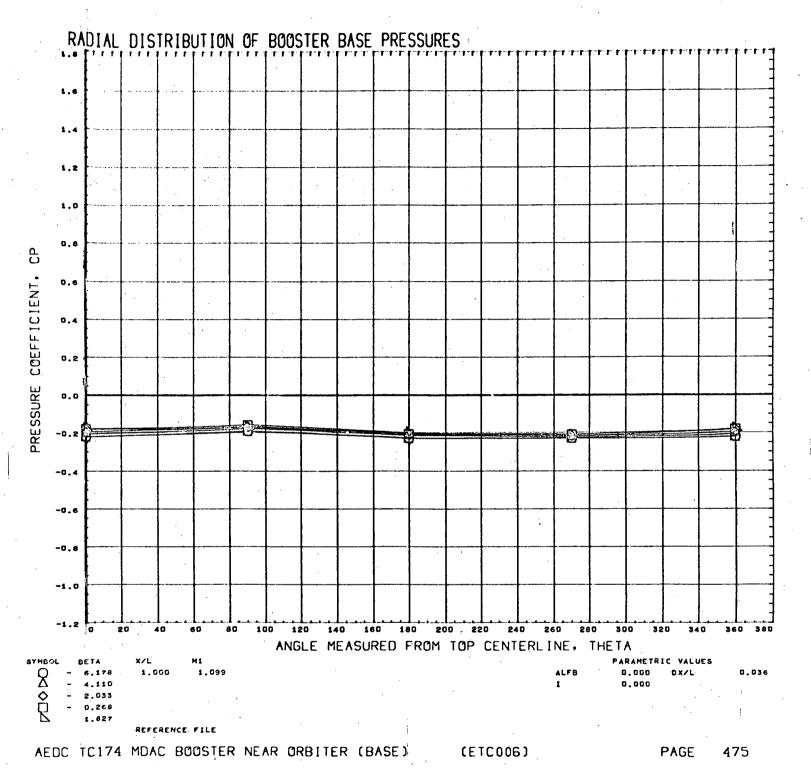


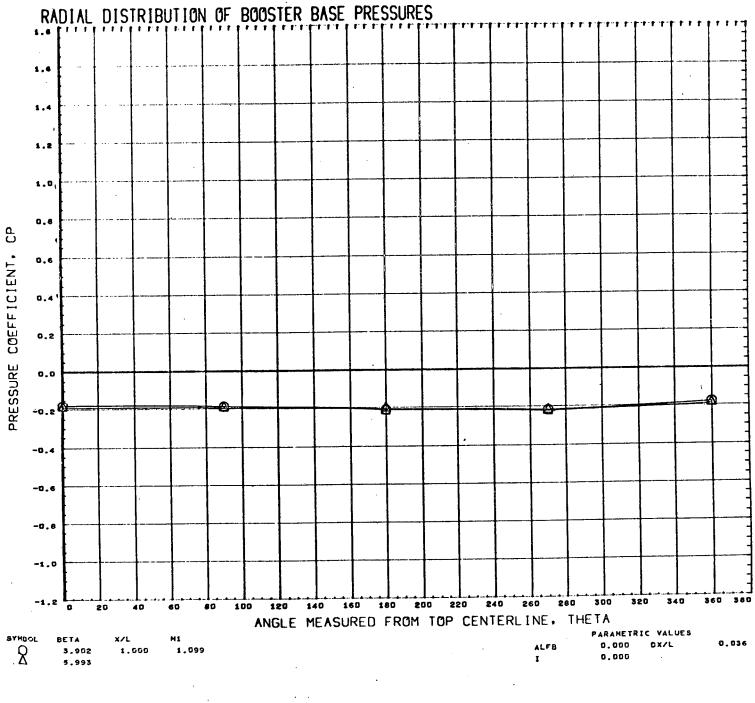


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC006)

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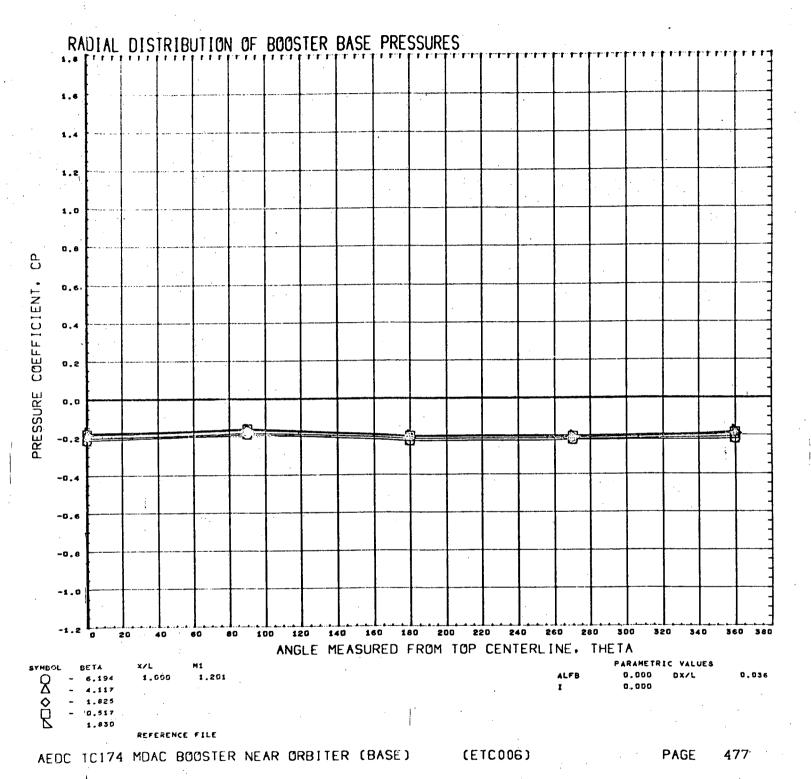


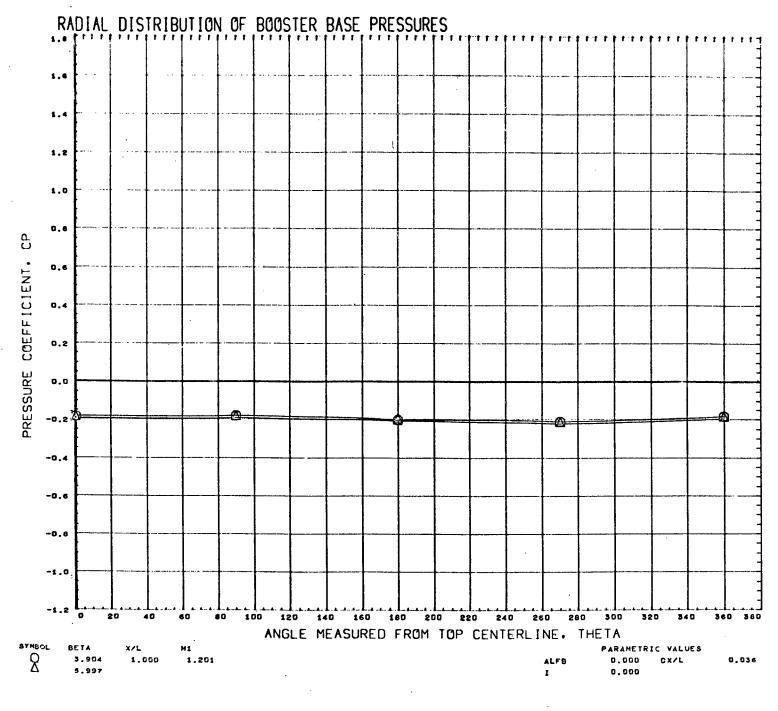


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC006)

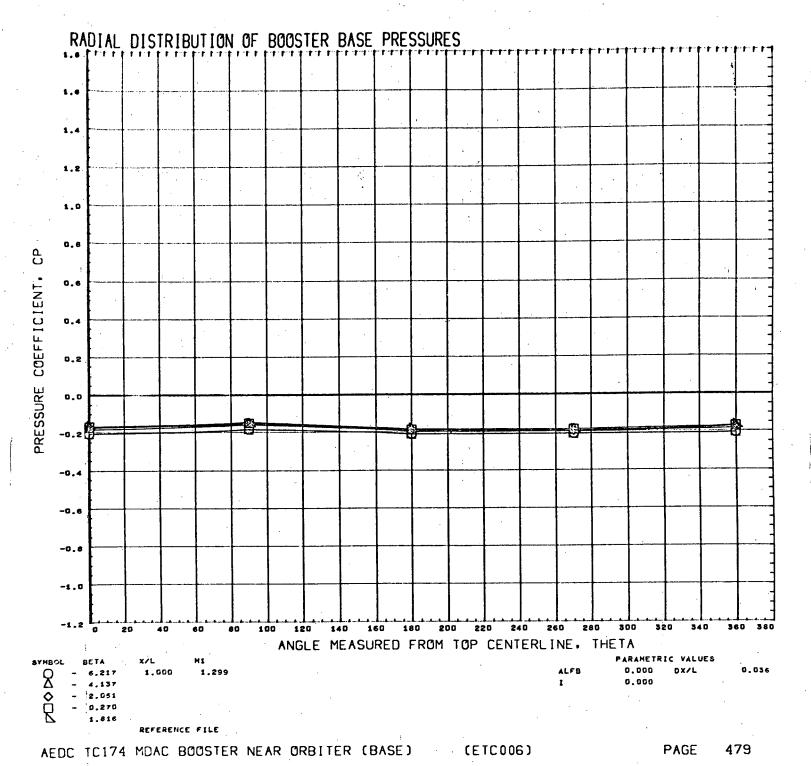
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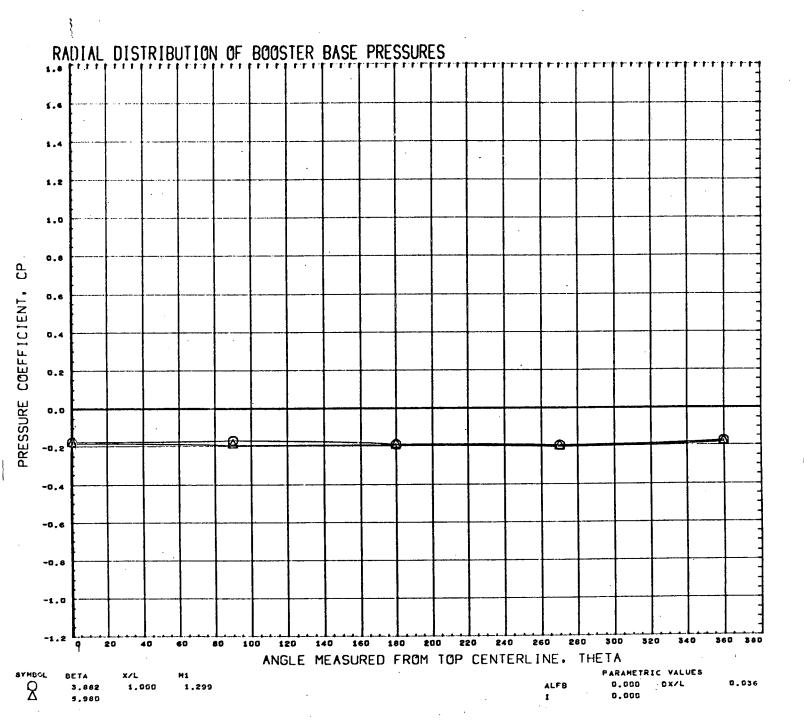




AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC006)



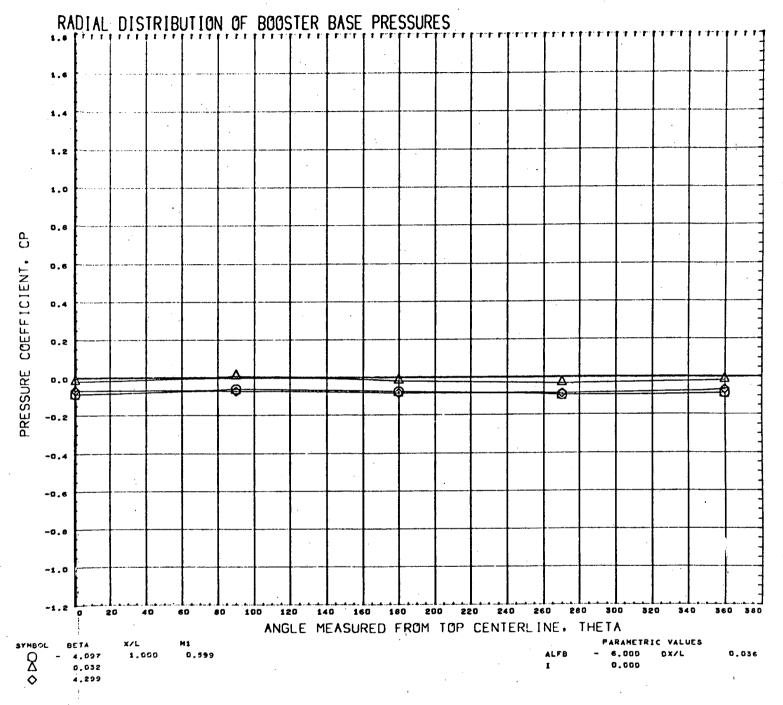


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC006)

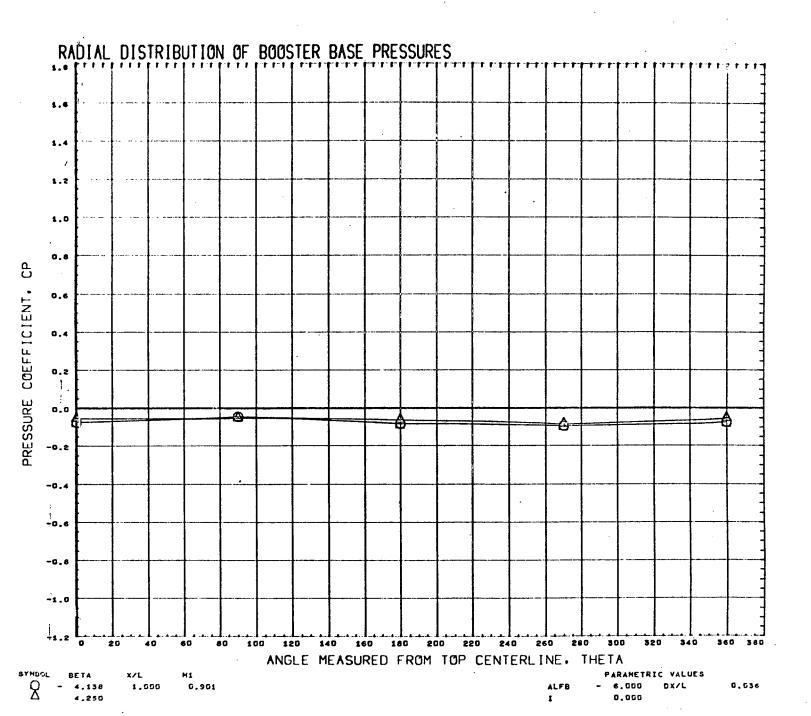
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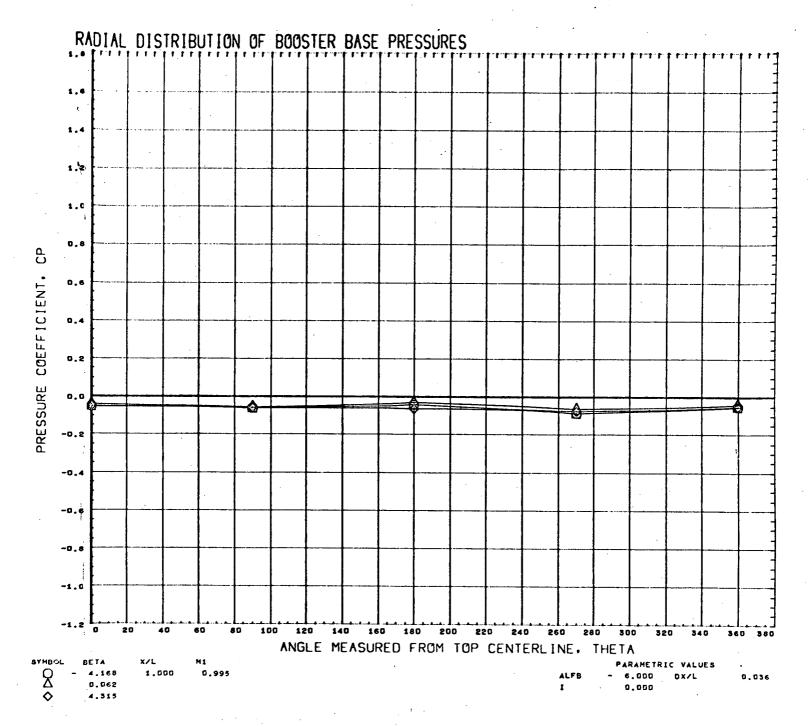
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC007)

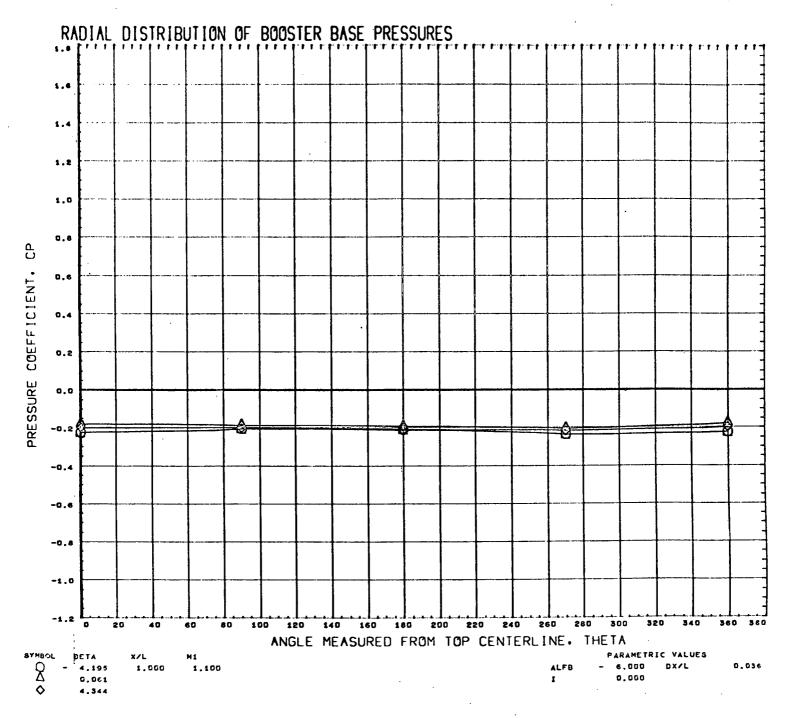


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC007)



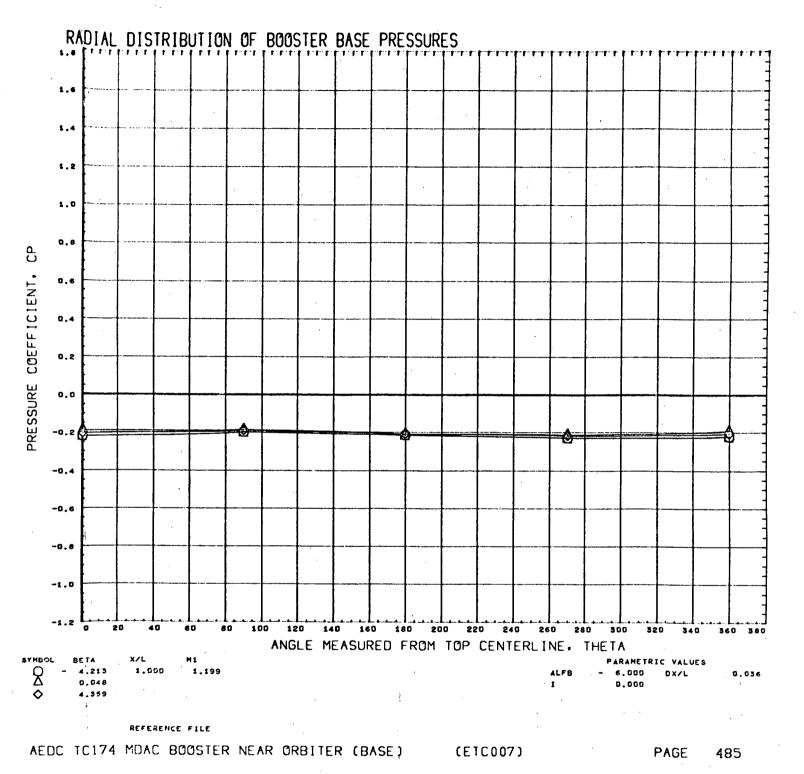
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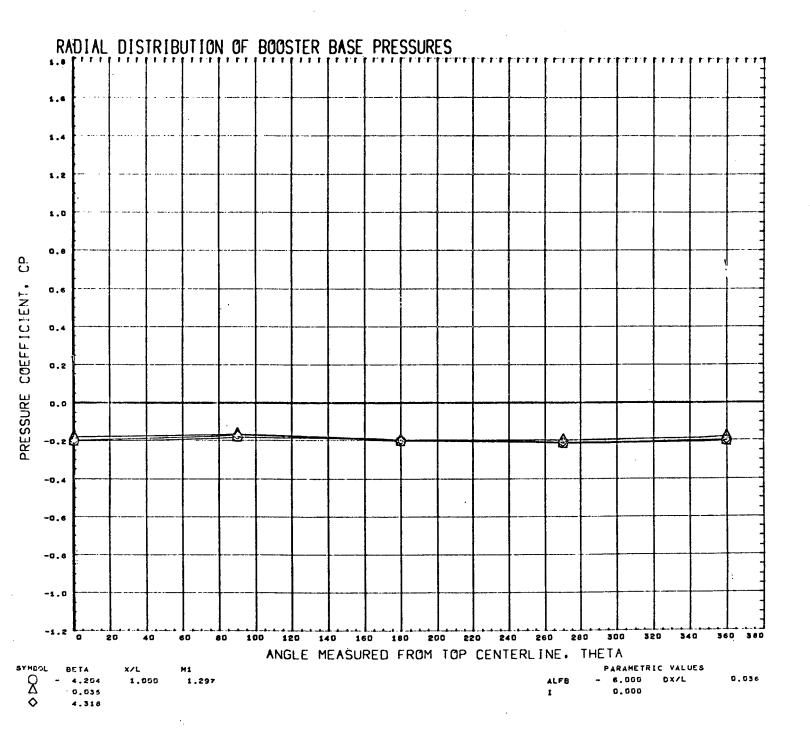


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

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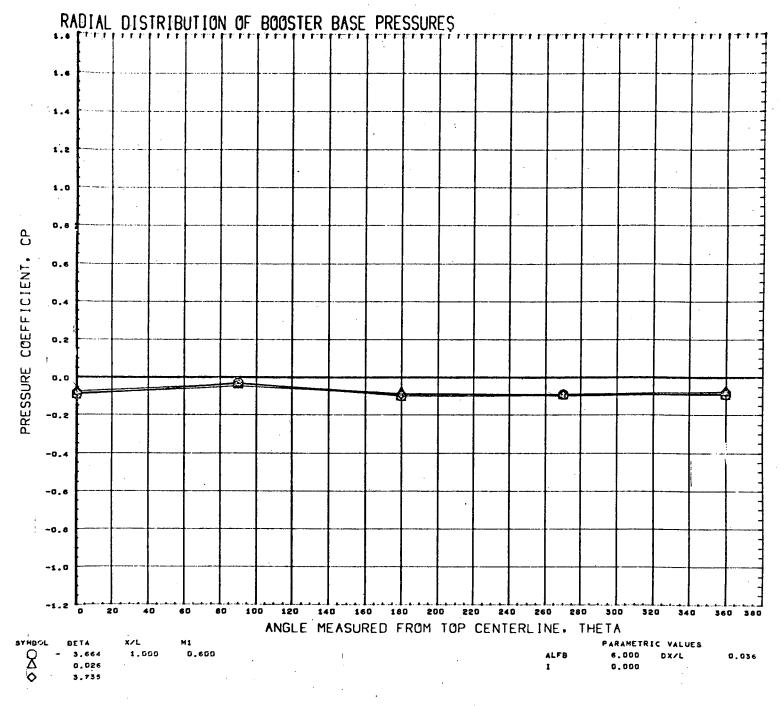
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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

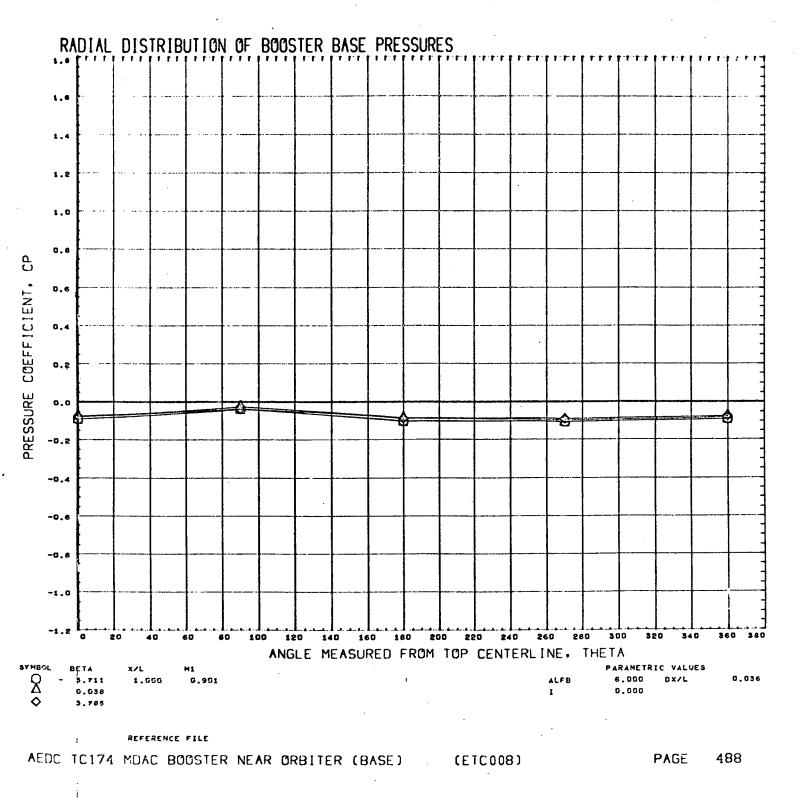
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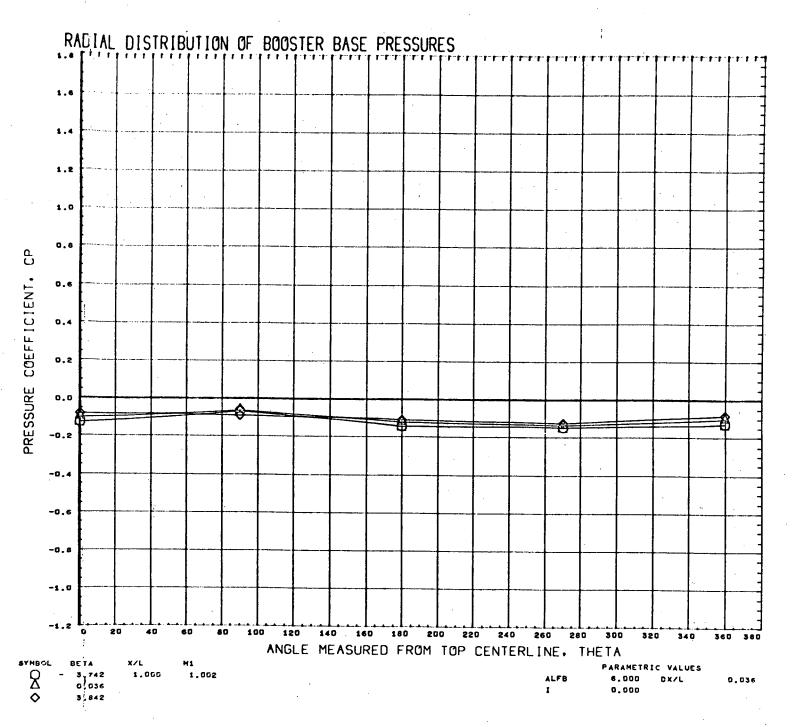


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC008)

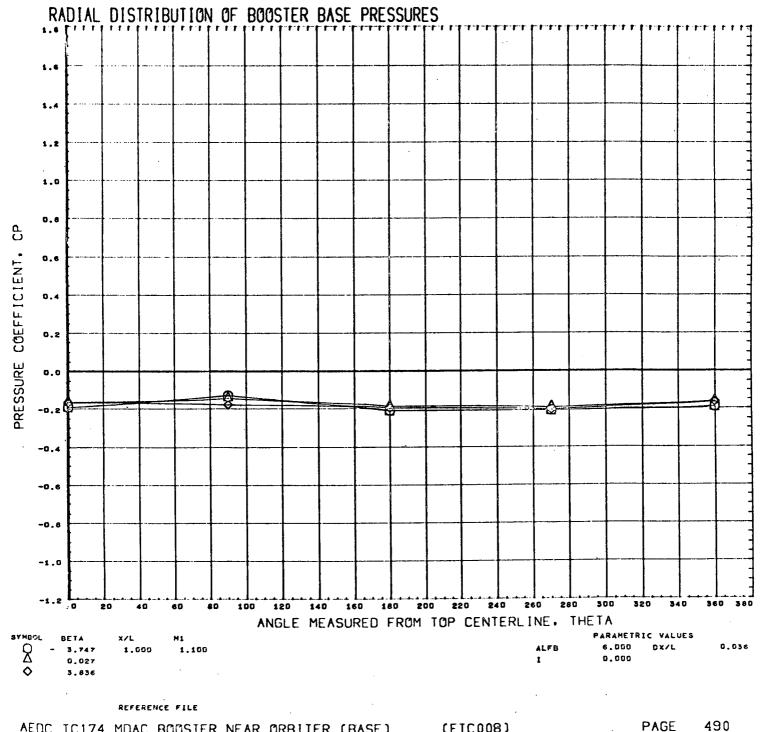
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AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

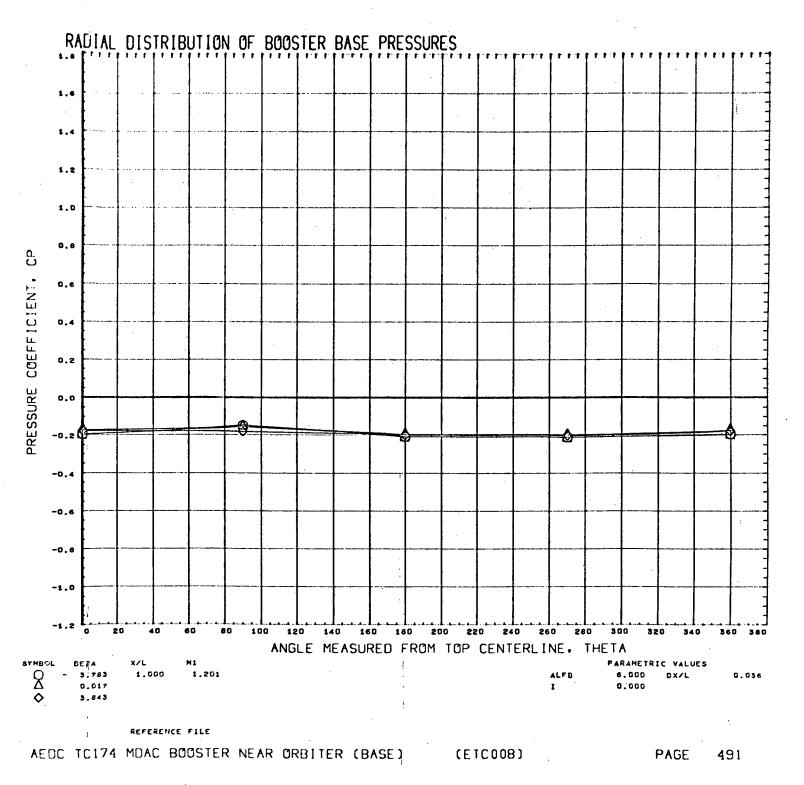
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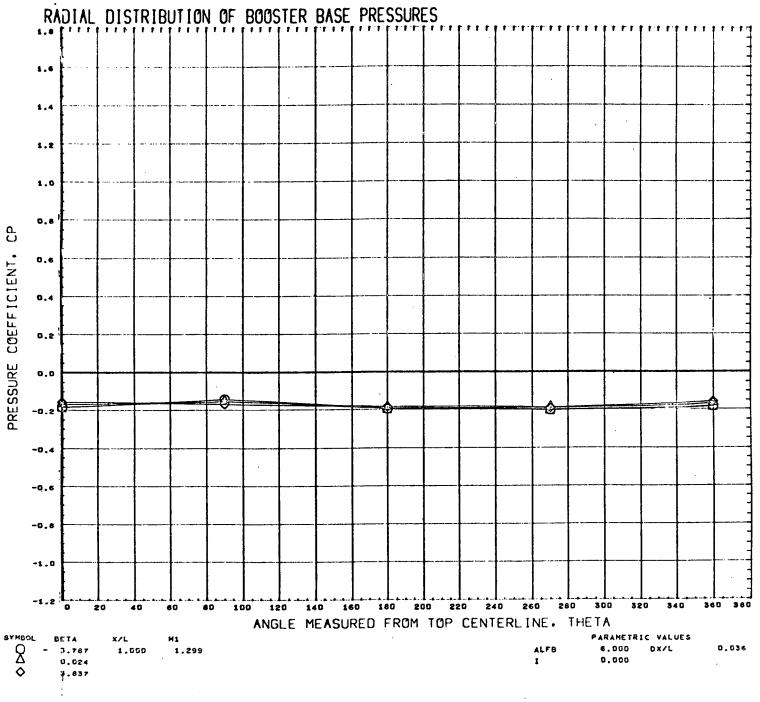


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

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(ETC008)

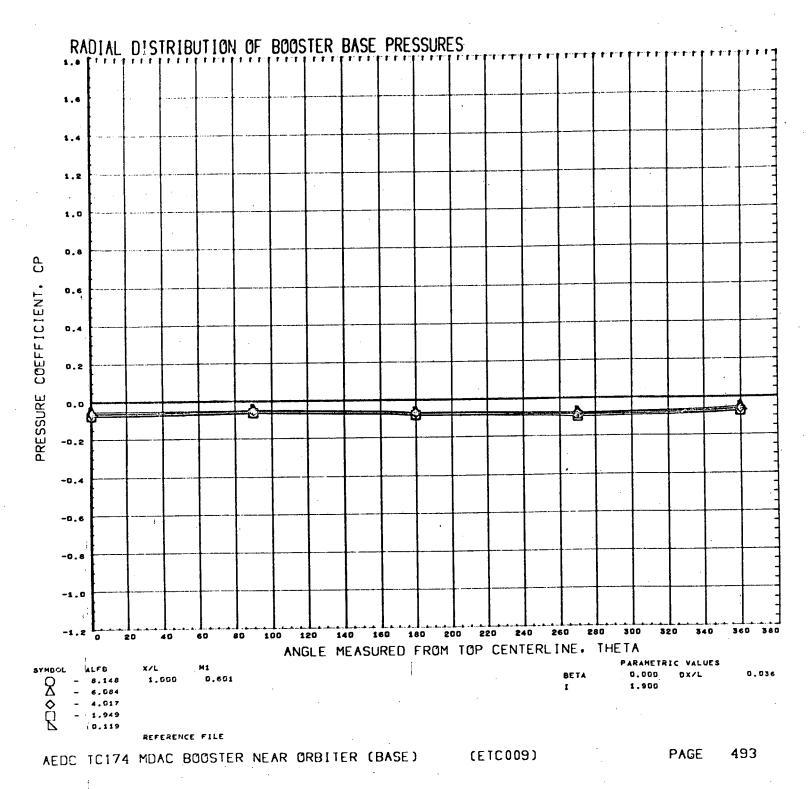


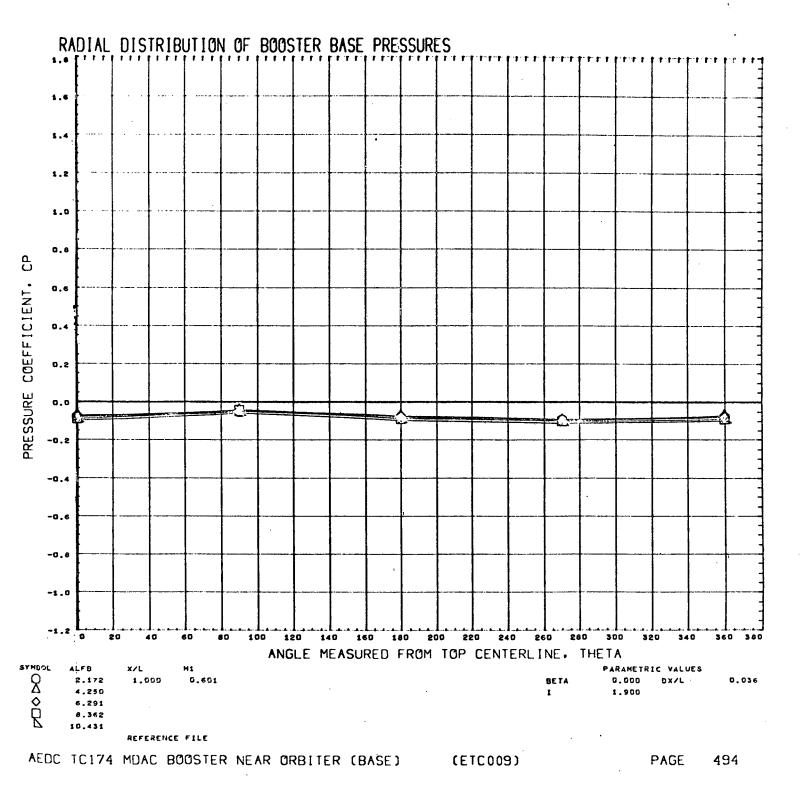


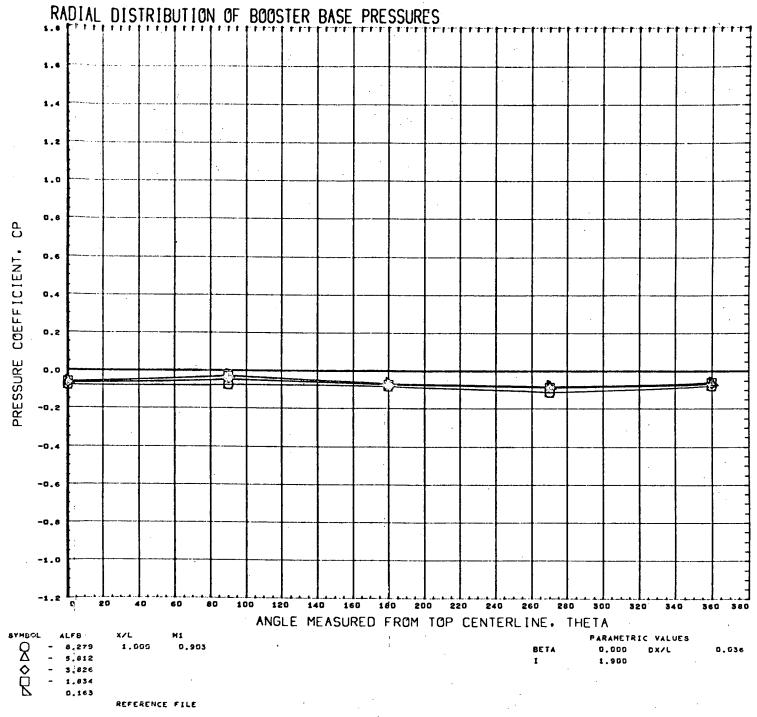
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC008)

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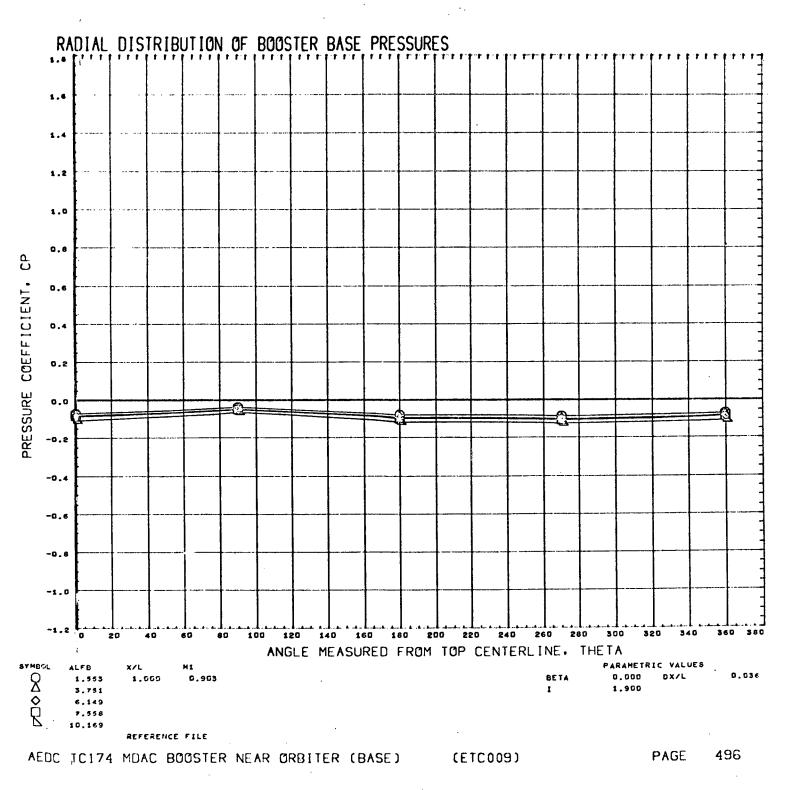


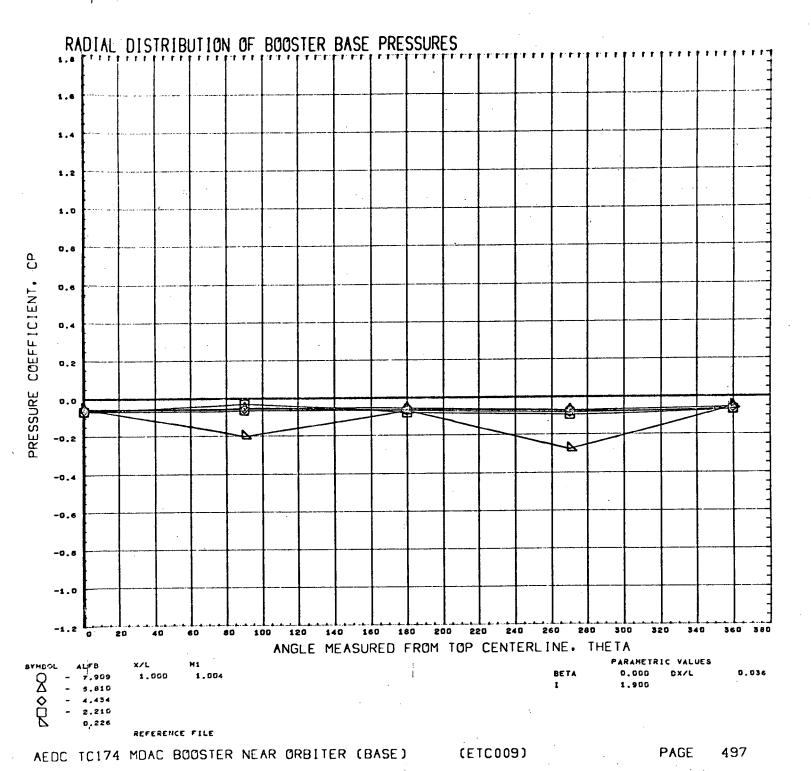


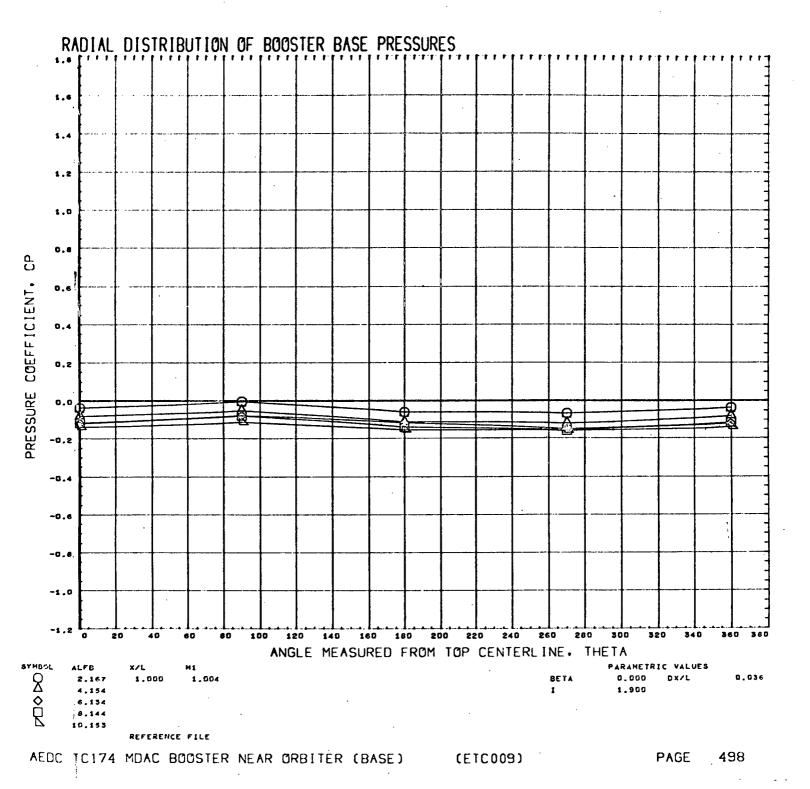


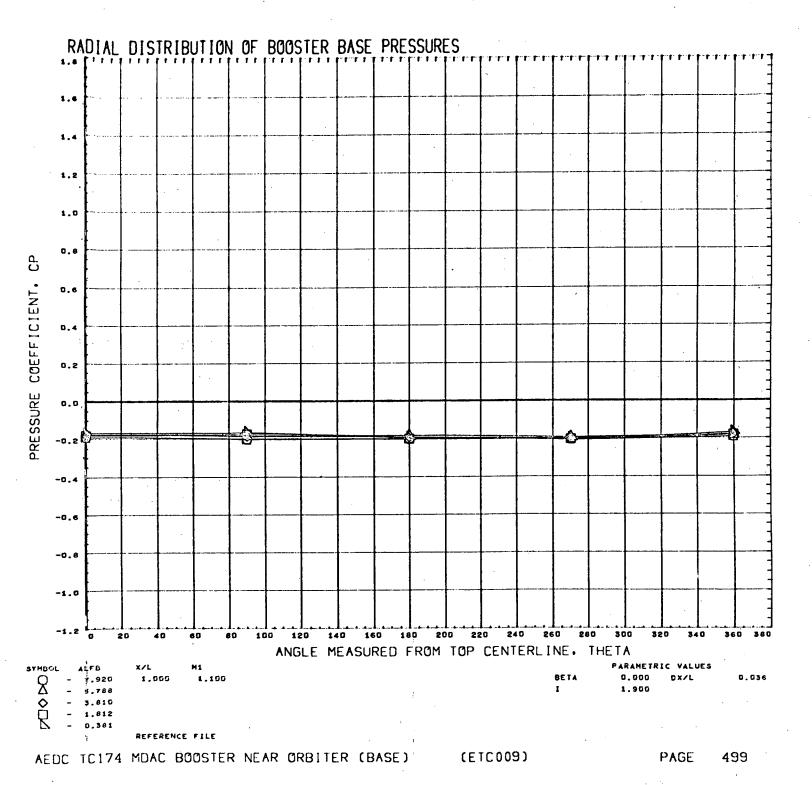
AEDC 10174 MDAC BOOSTER NEAR ORBITER (BASE)

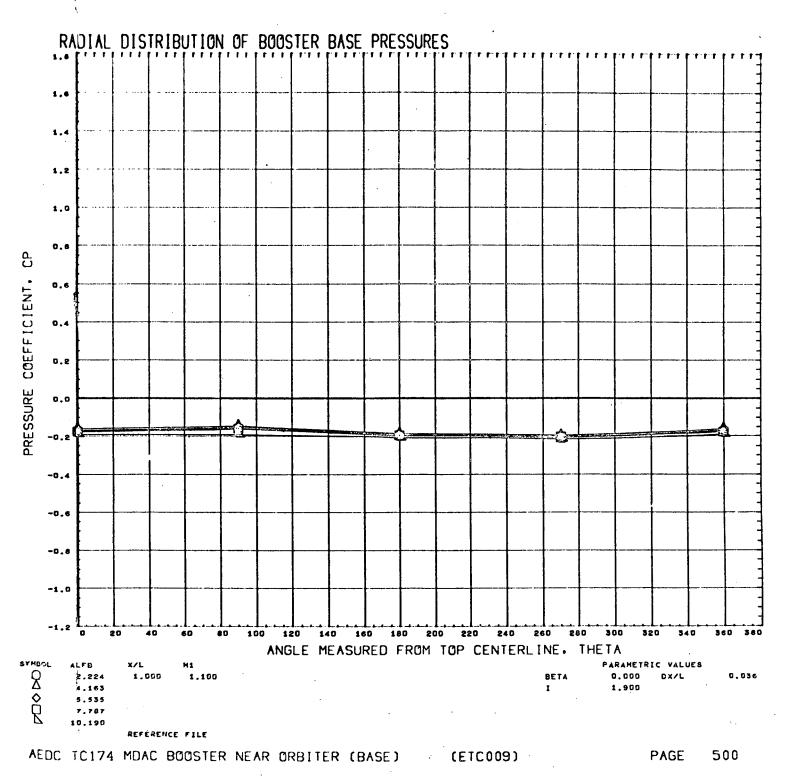
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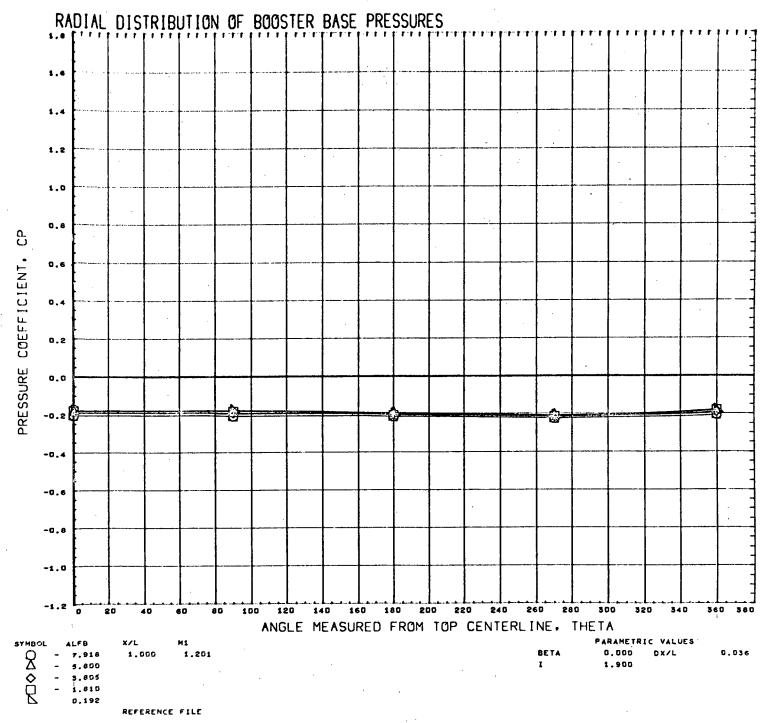












AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

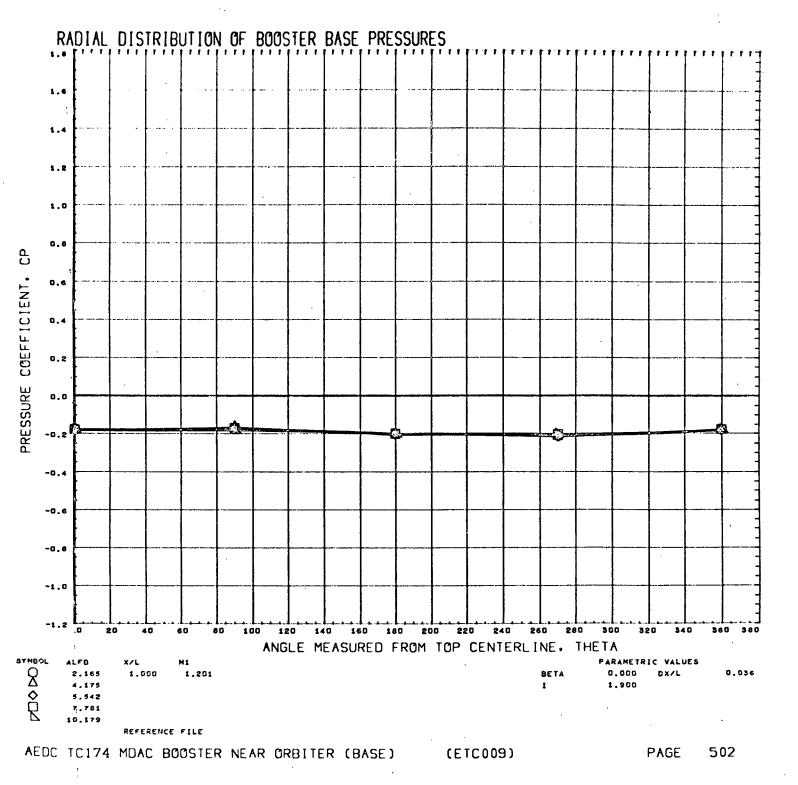
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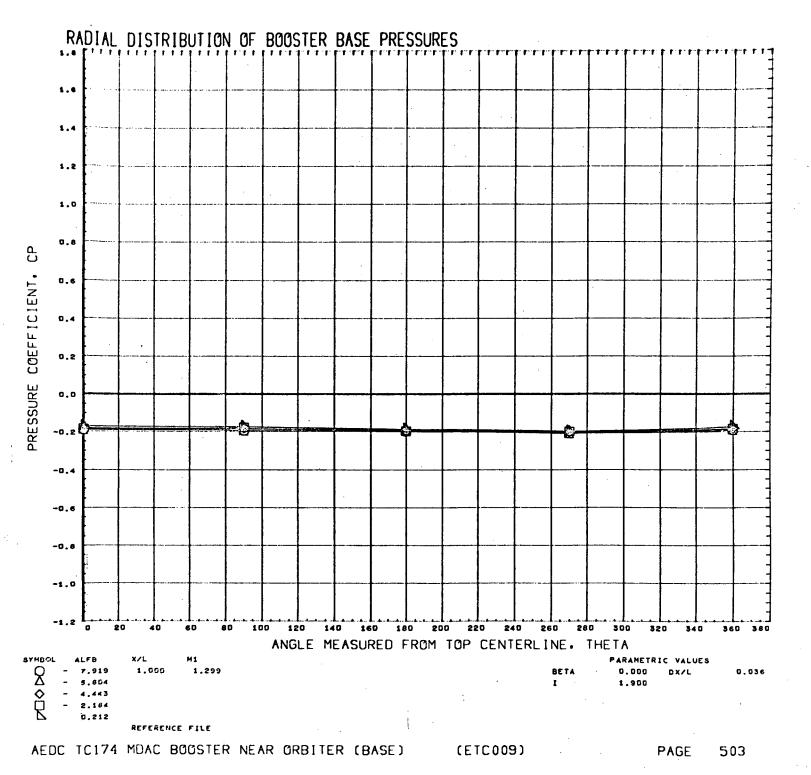
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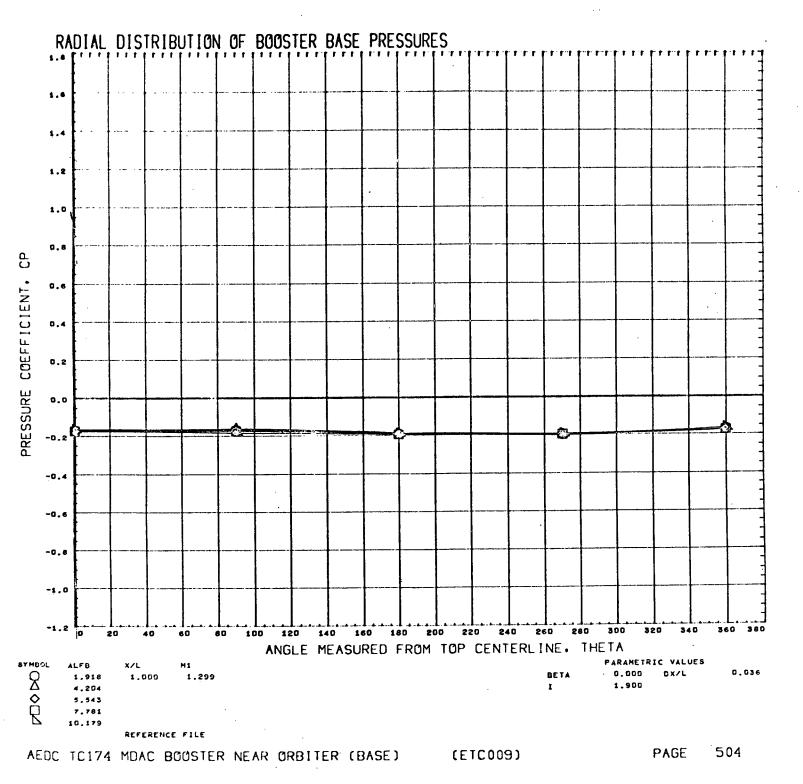
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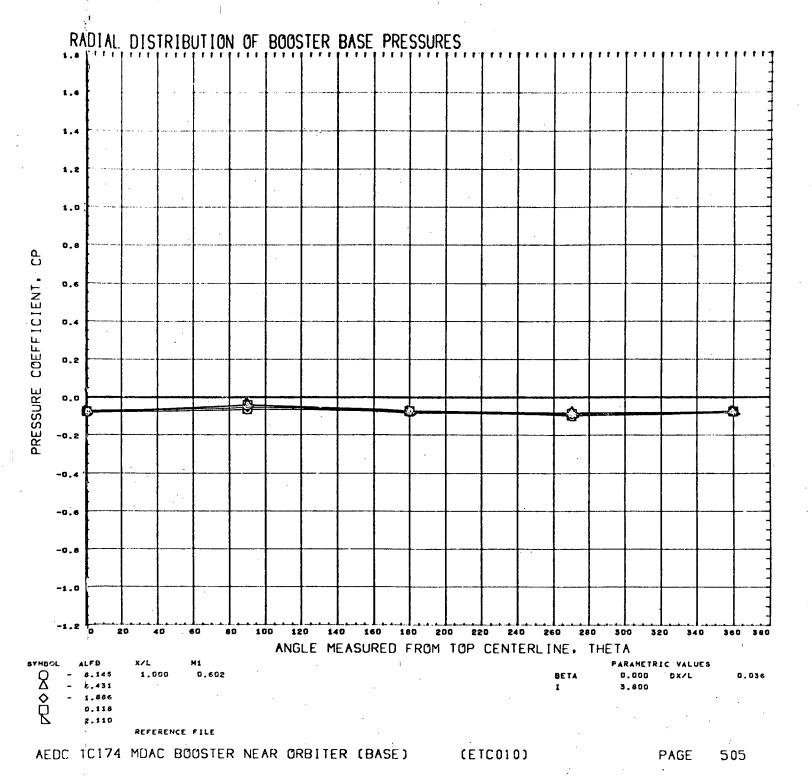
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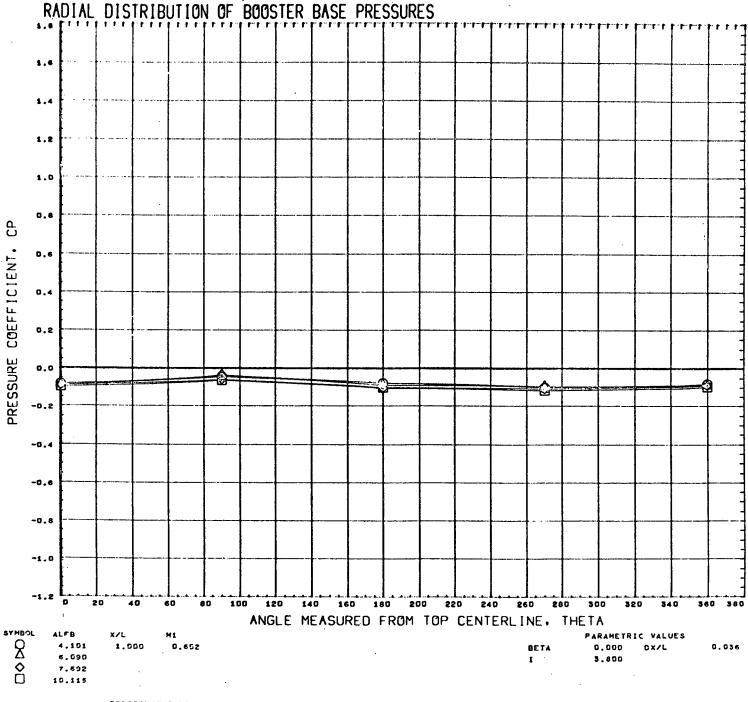
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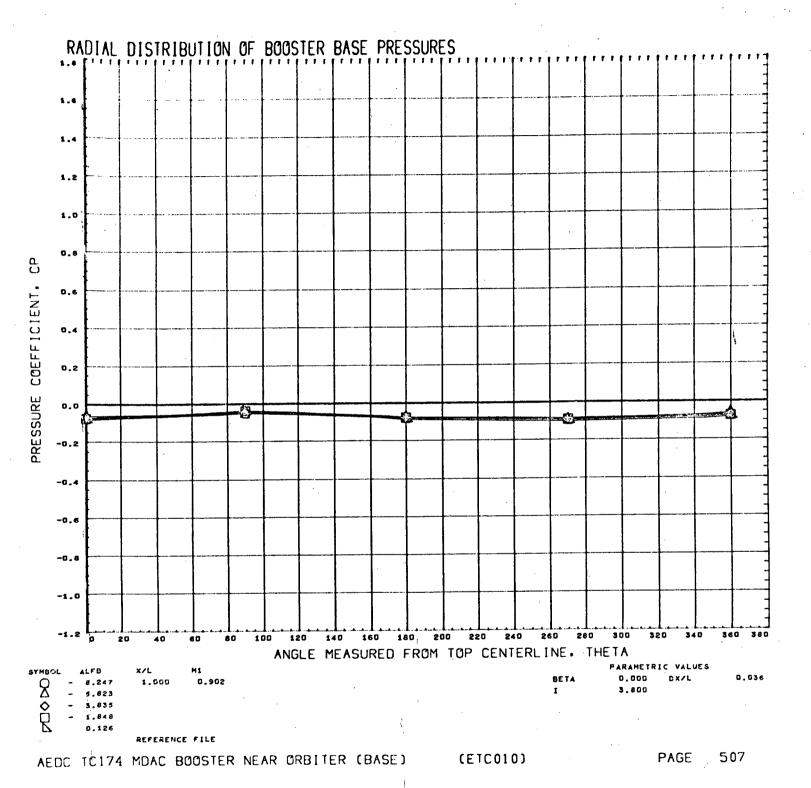
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

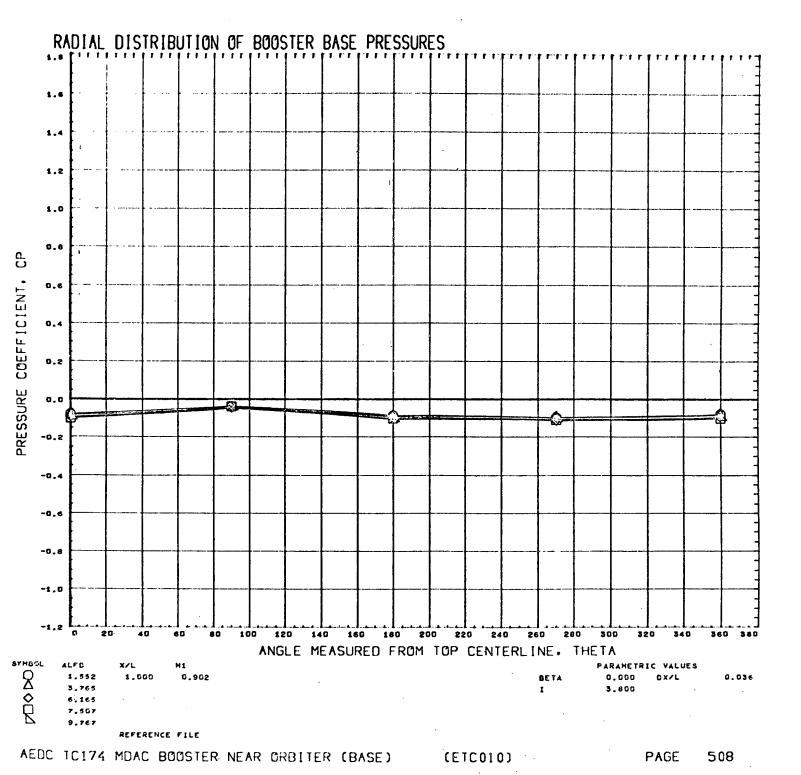
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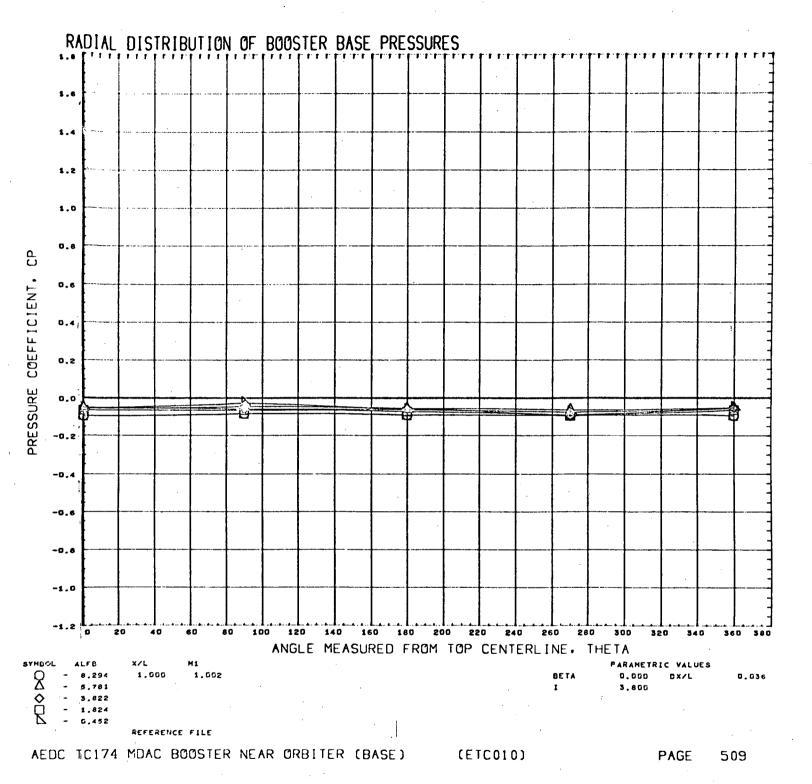
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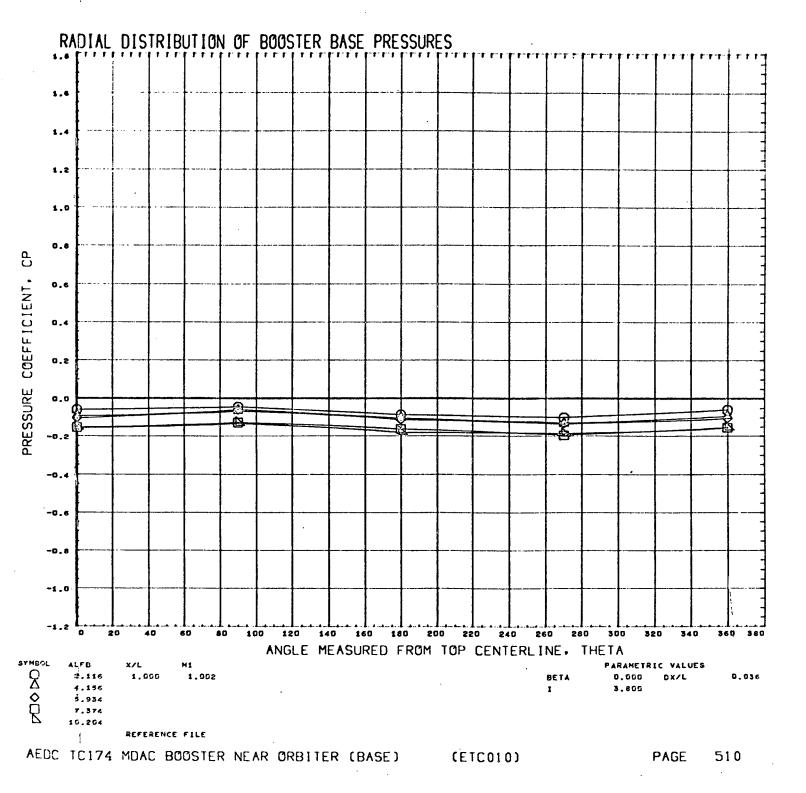
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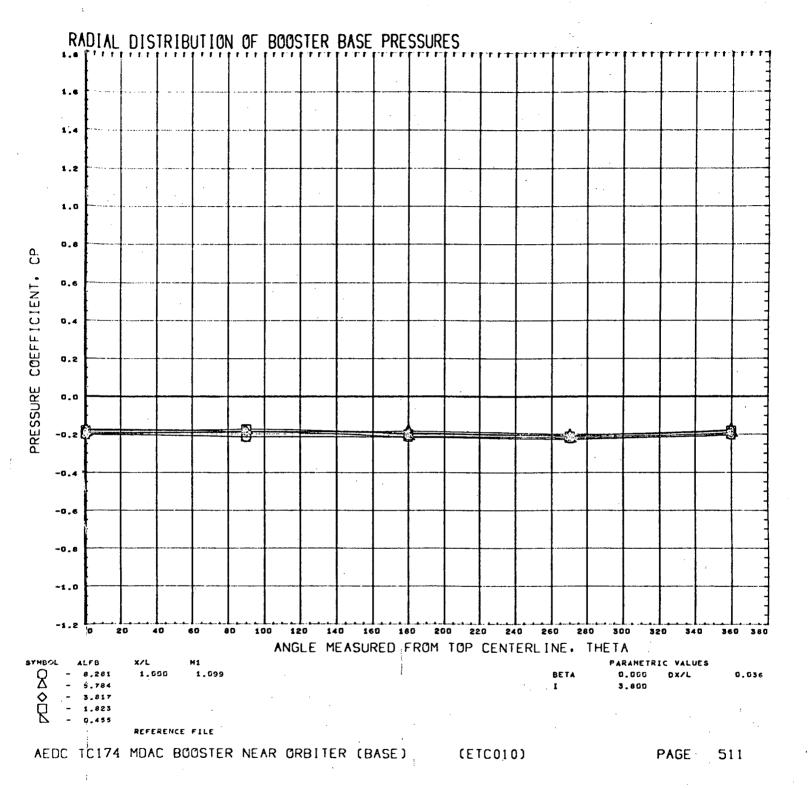
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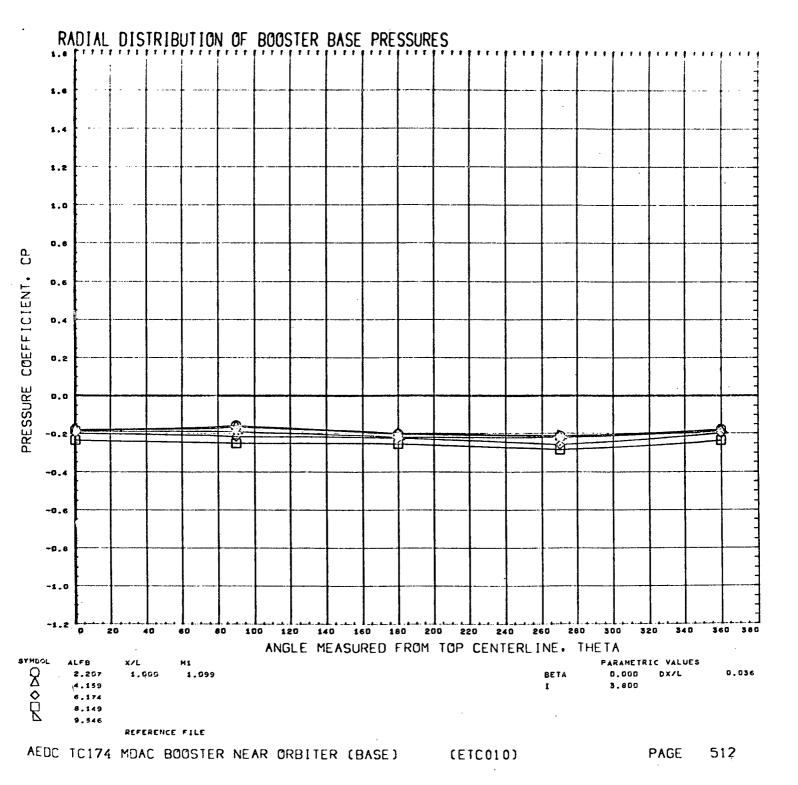


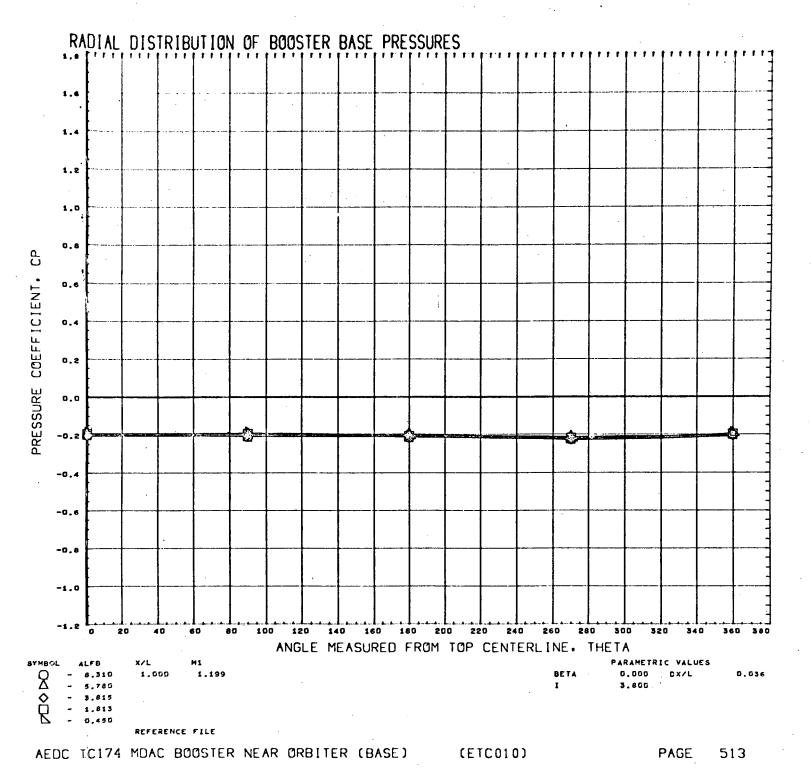


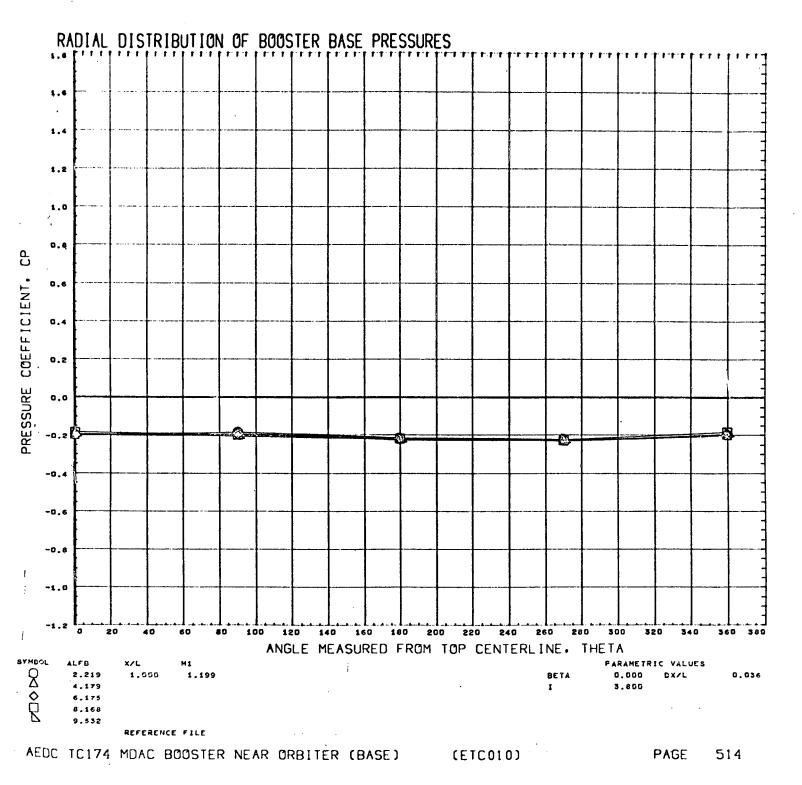


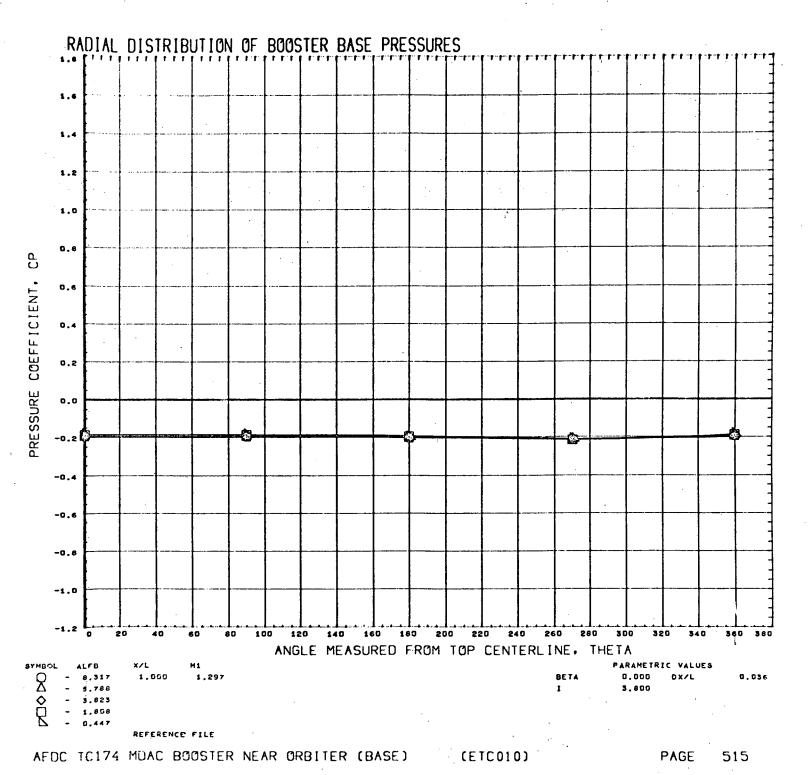


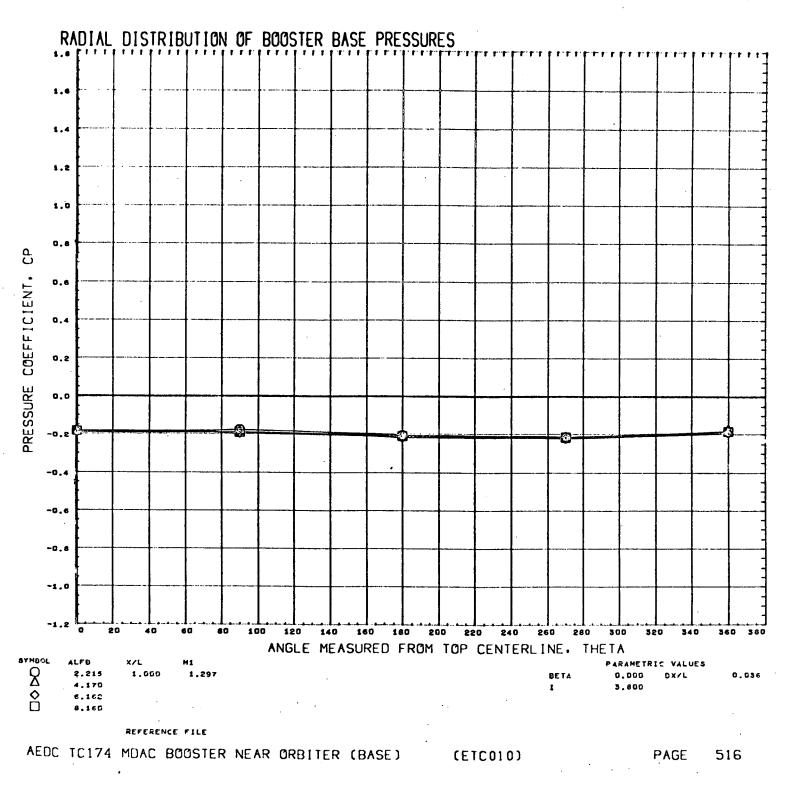


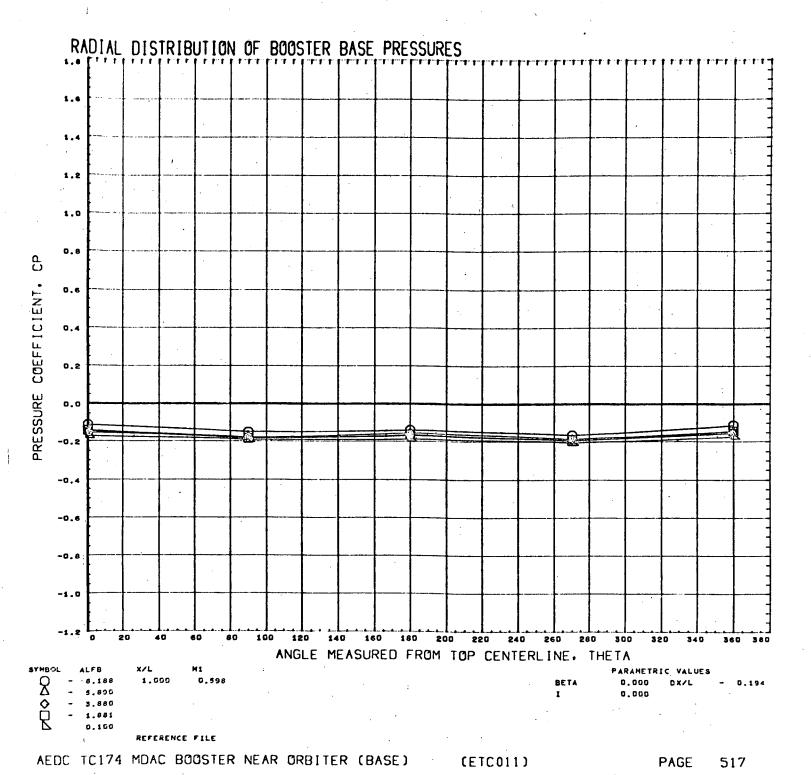


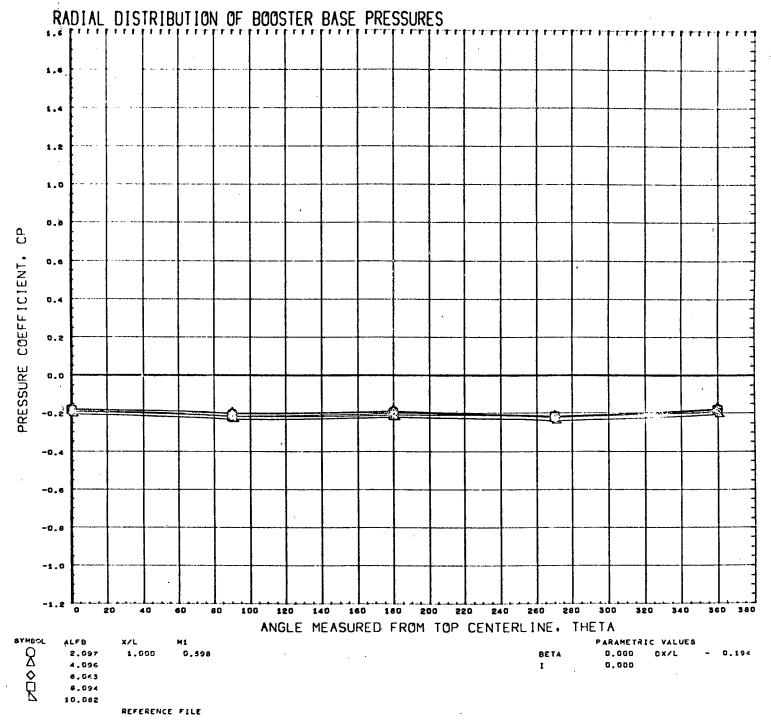






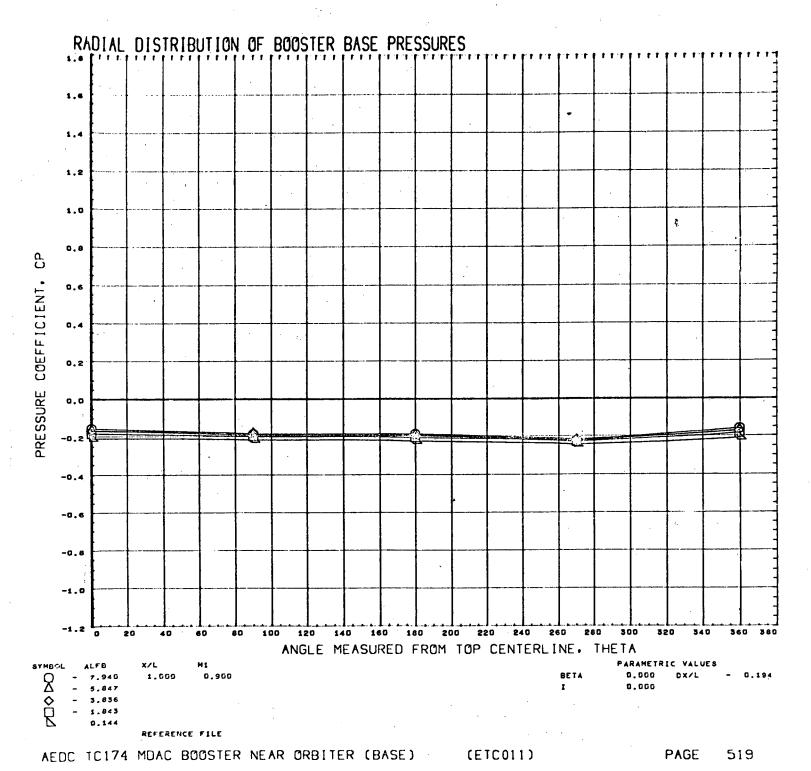




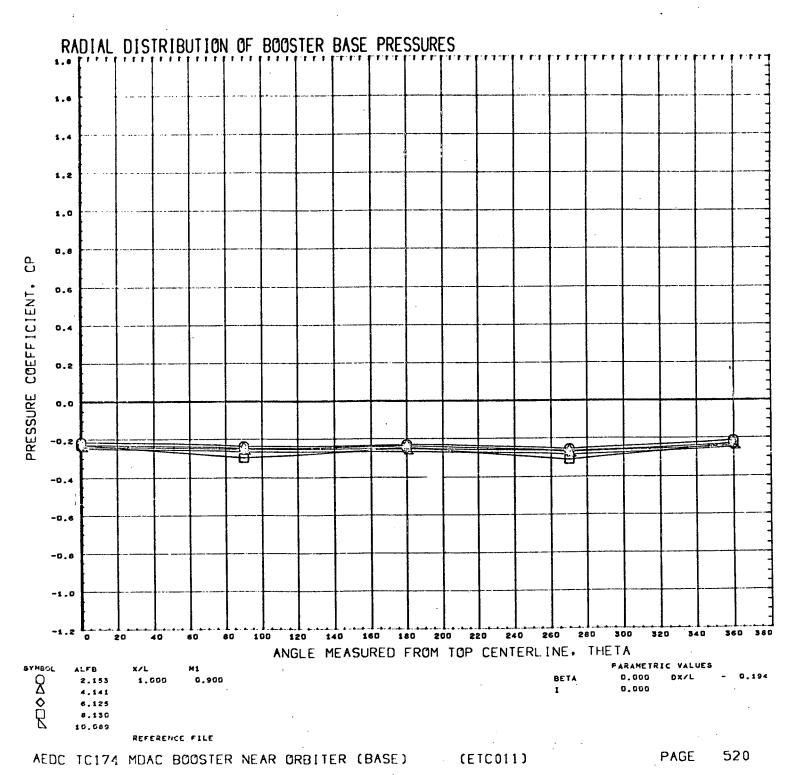


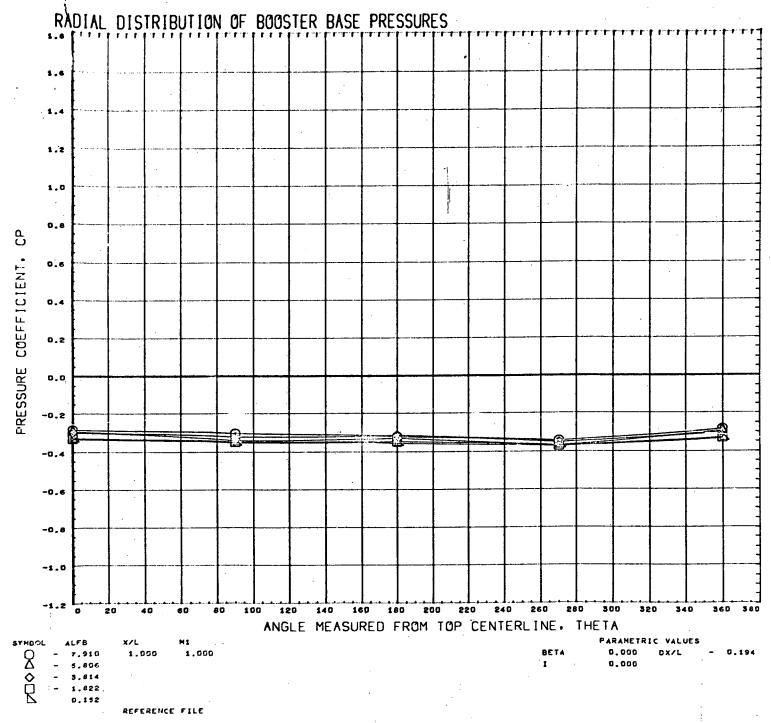
AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

(ETC011)



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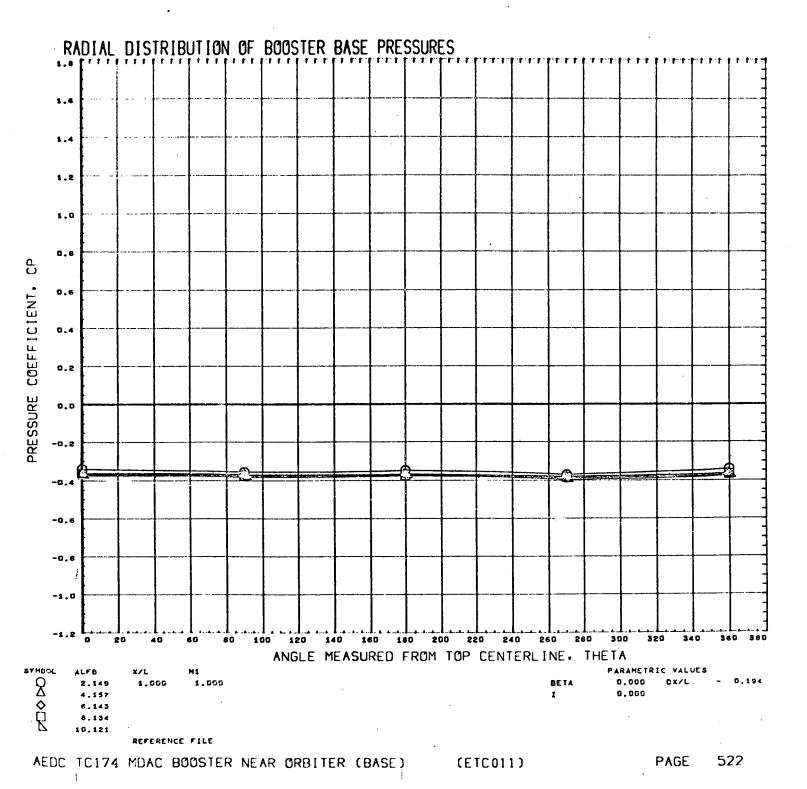


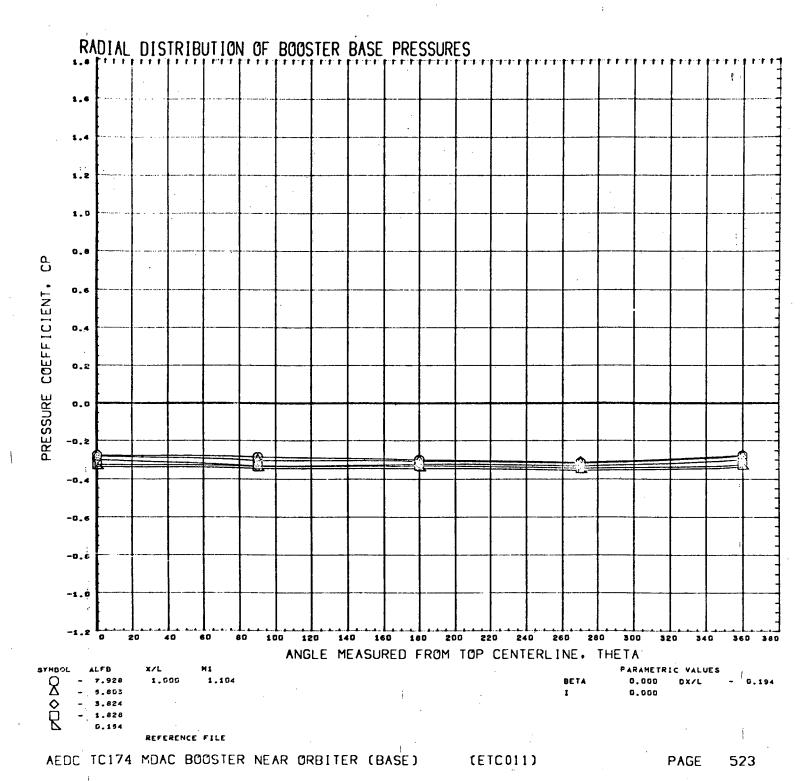
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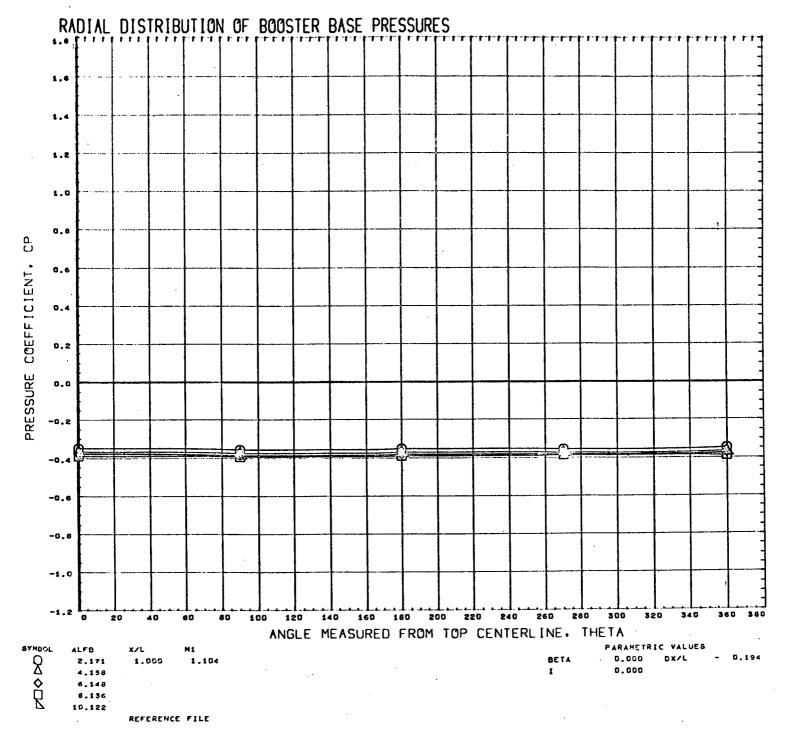
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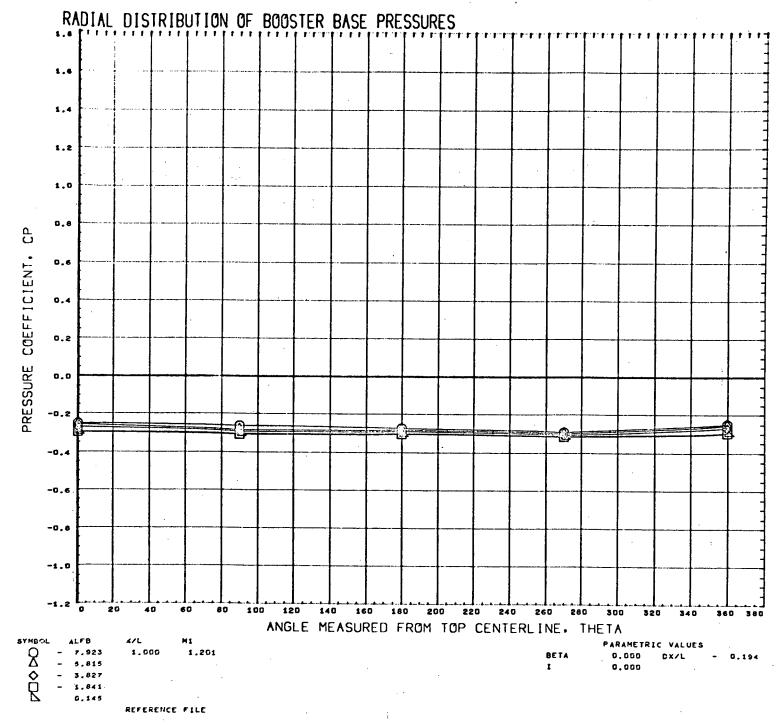




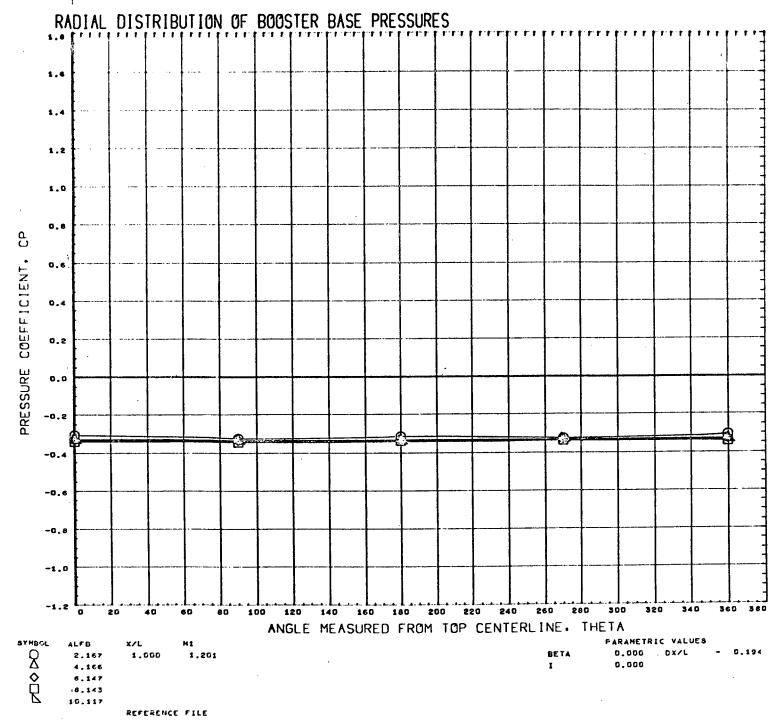


AEDC TC174 MDAC BOOSTER NEAR ORBITER (BASE)

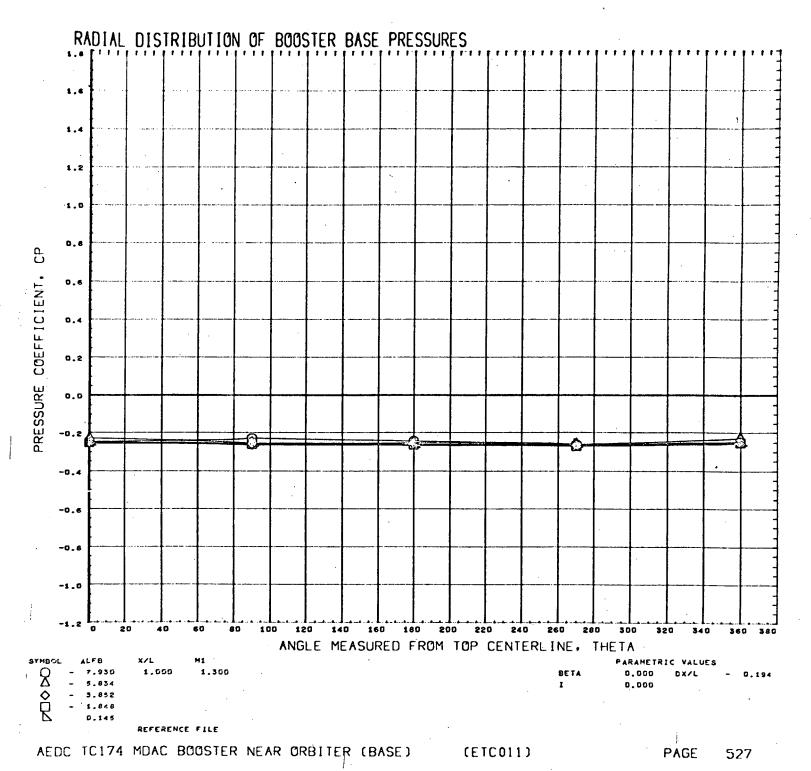
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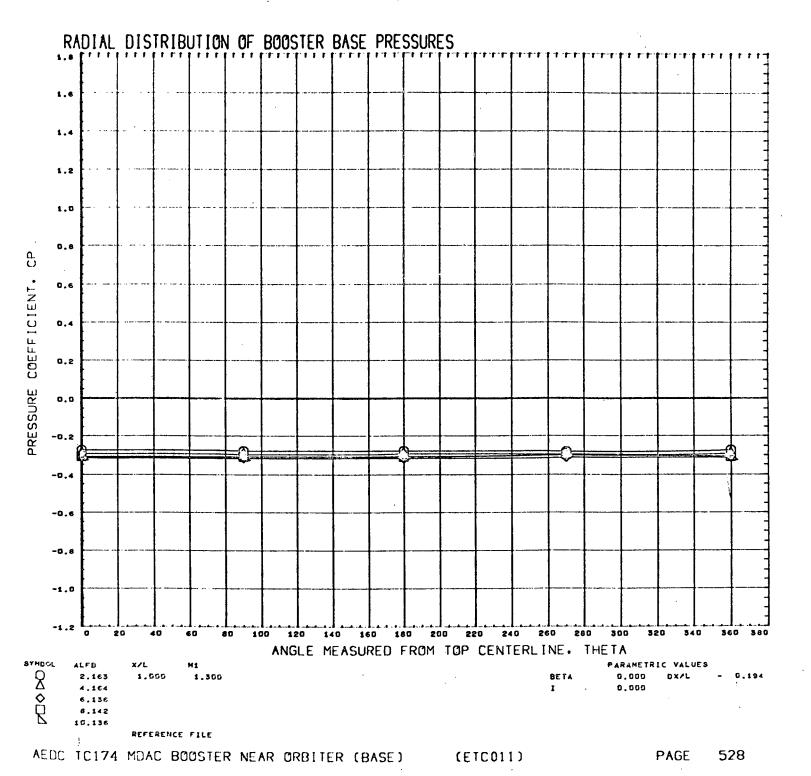


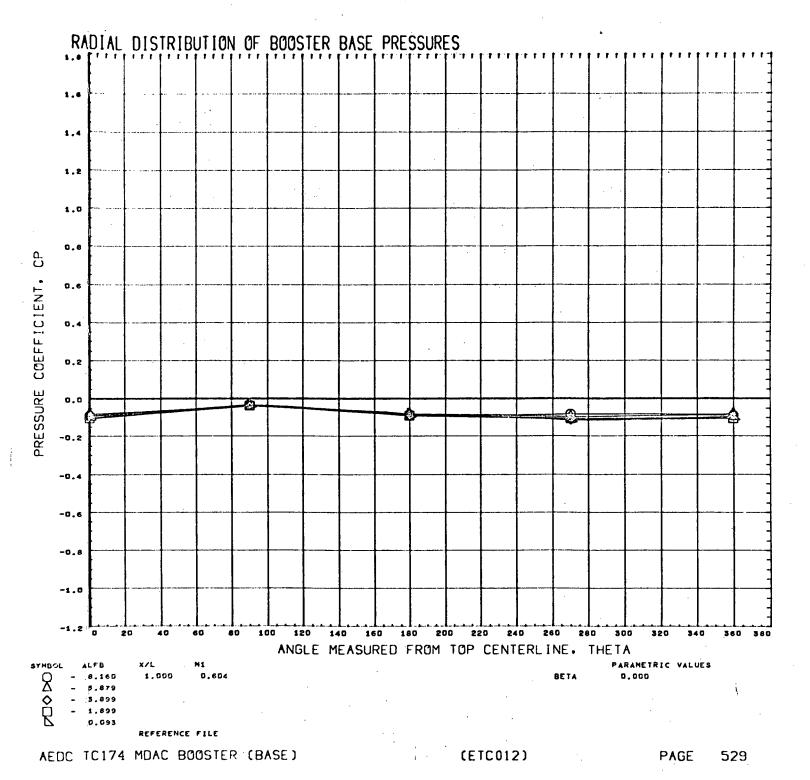
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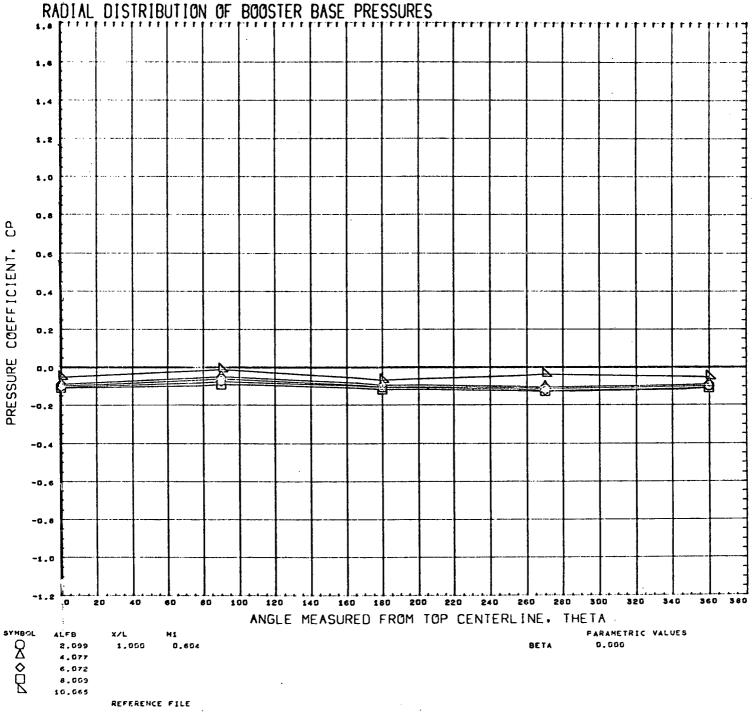


AEDC TC174 MOAC BOOSTER NEAR ORBITER (BASE) (ETC011)



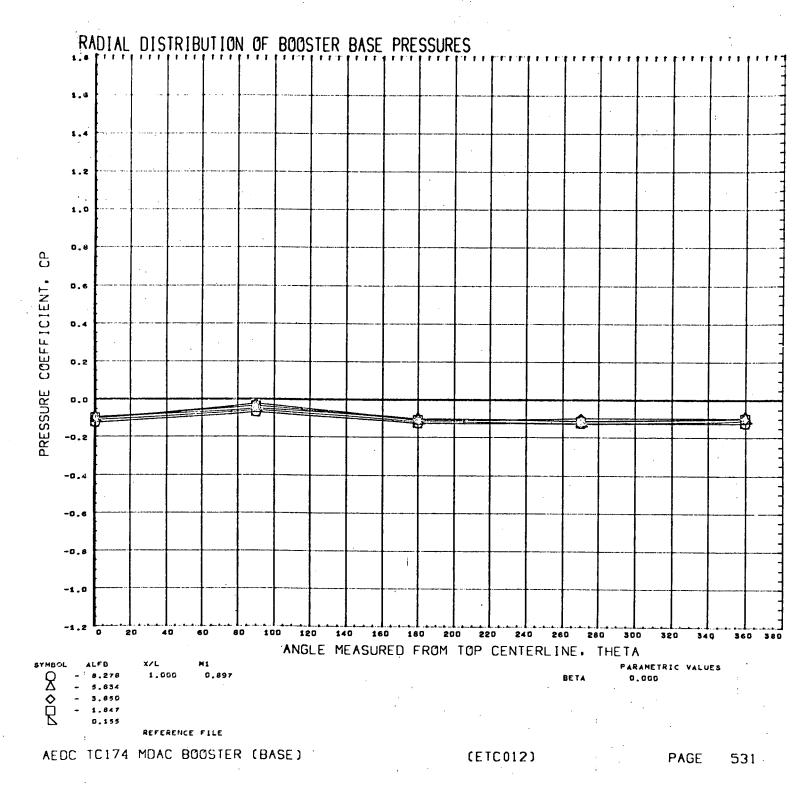


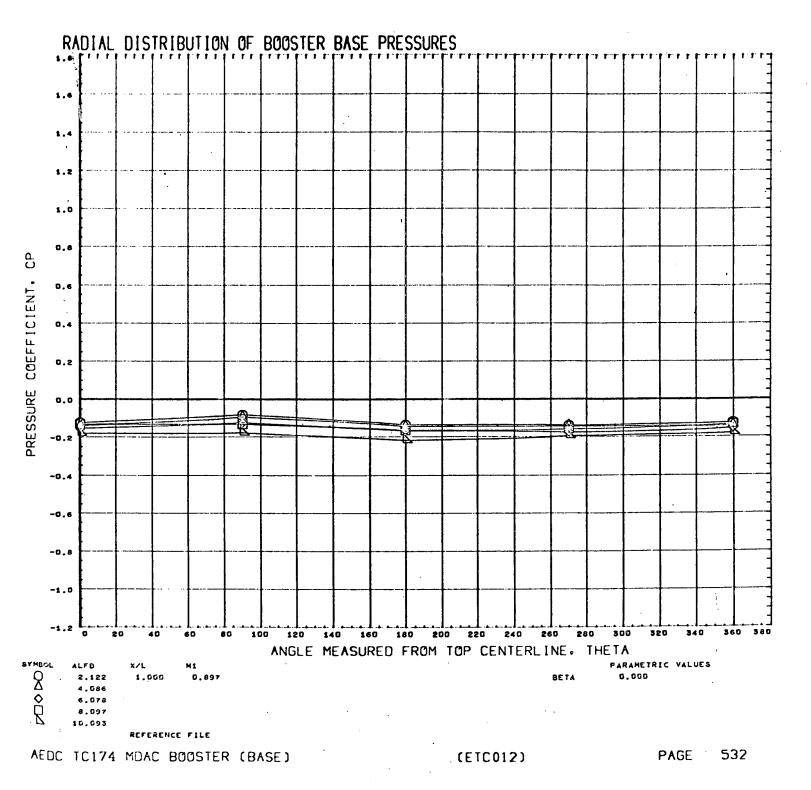


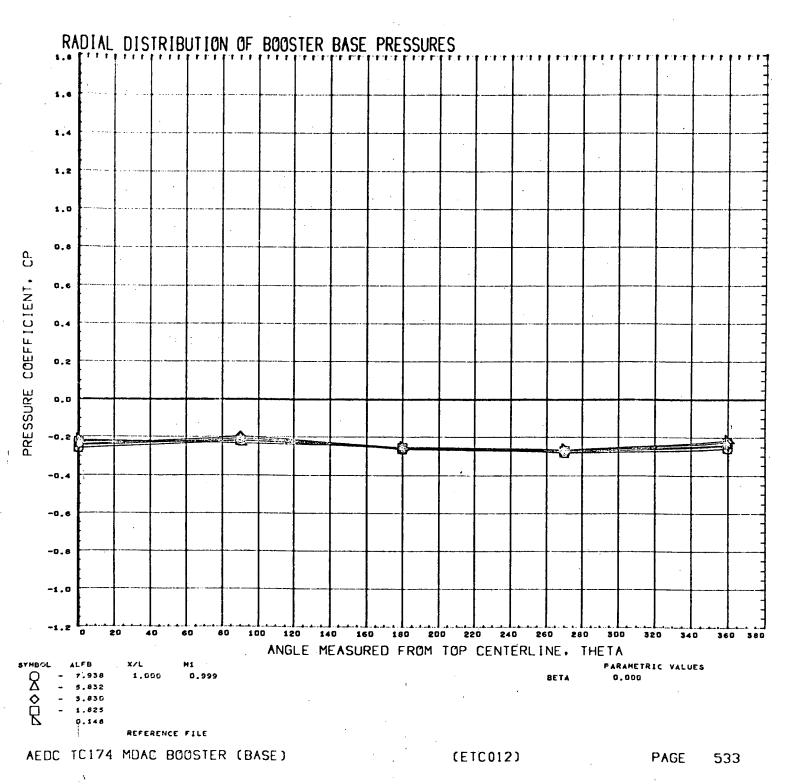


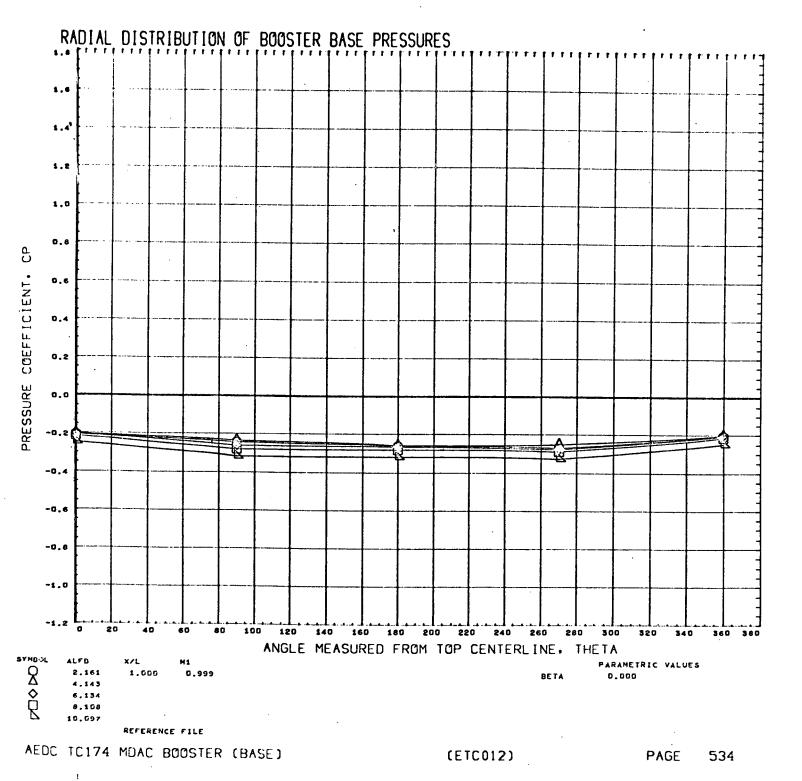
AEDC TC174 MDAC BOOSTER (BASE)

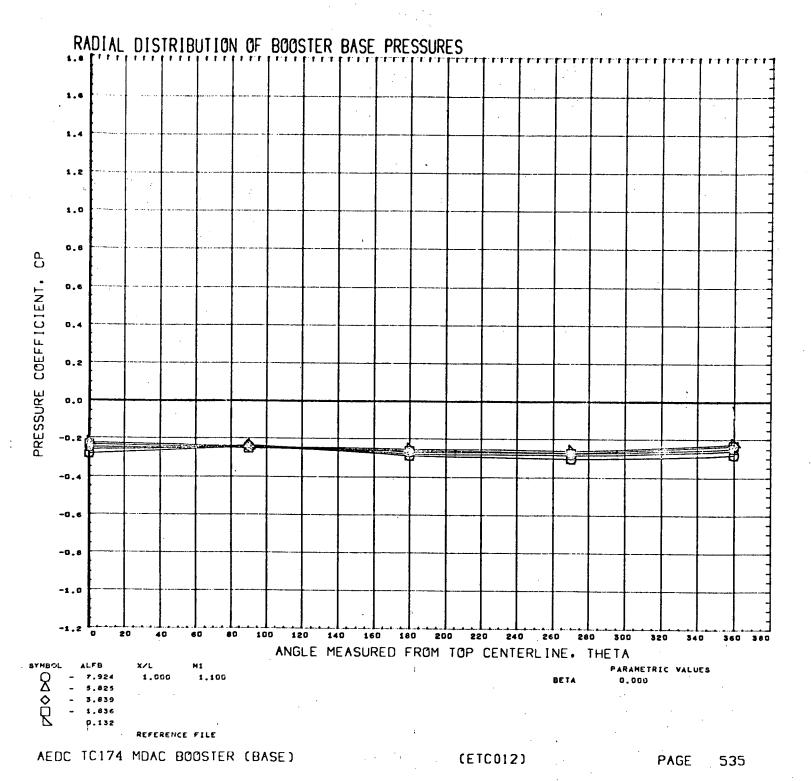
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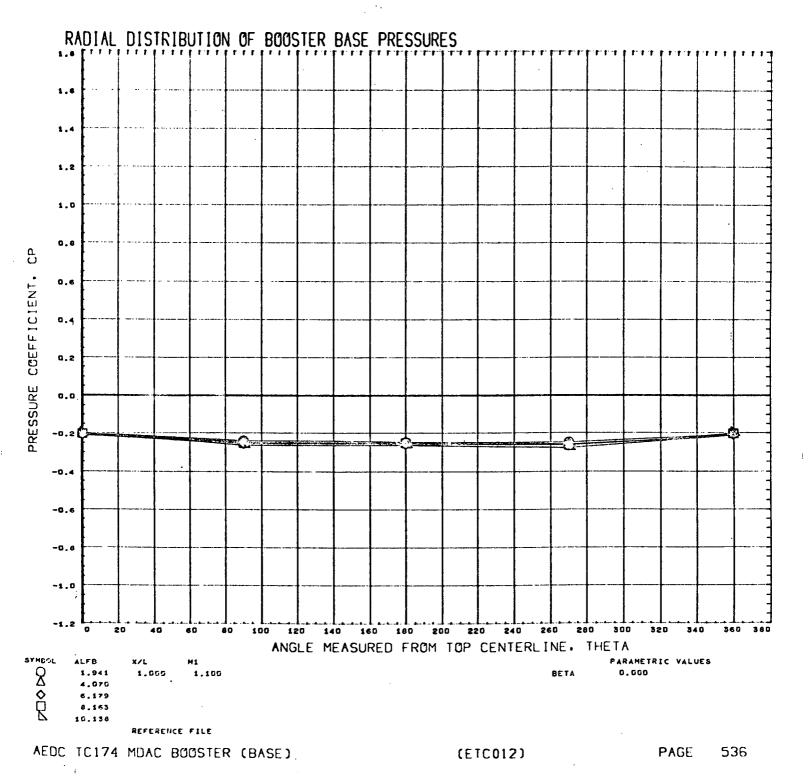


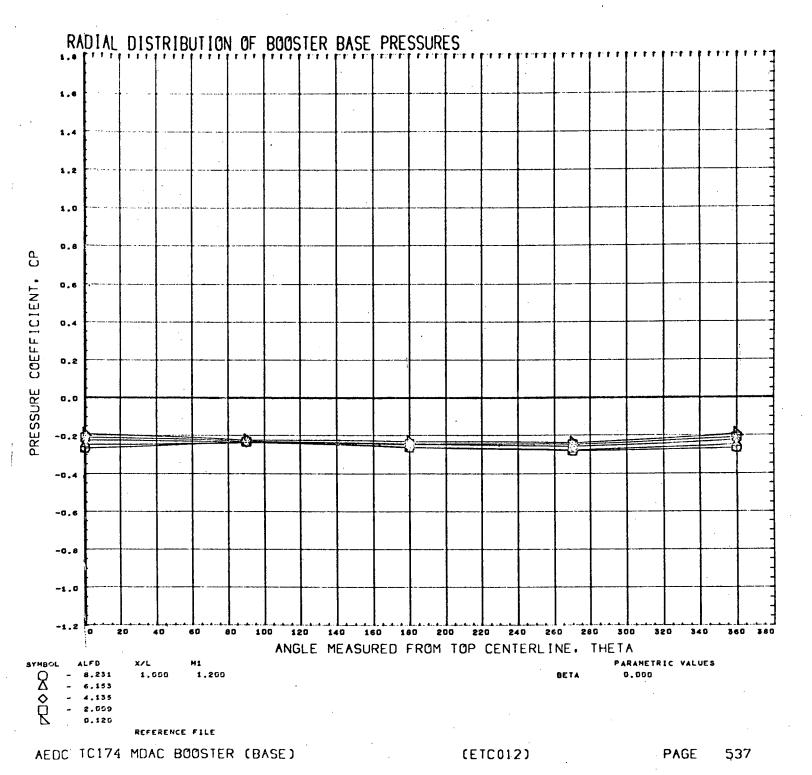


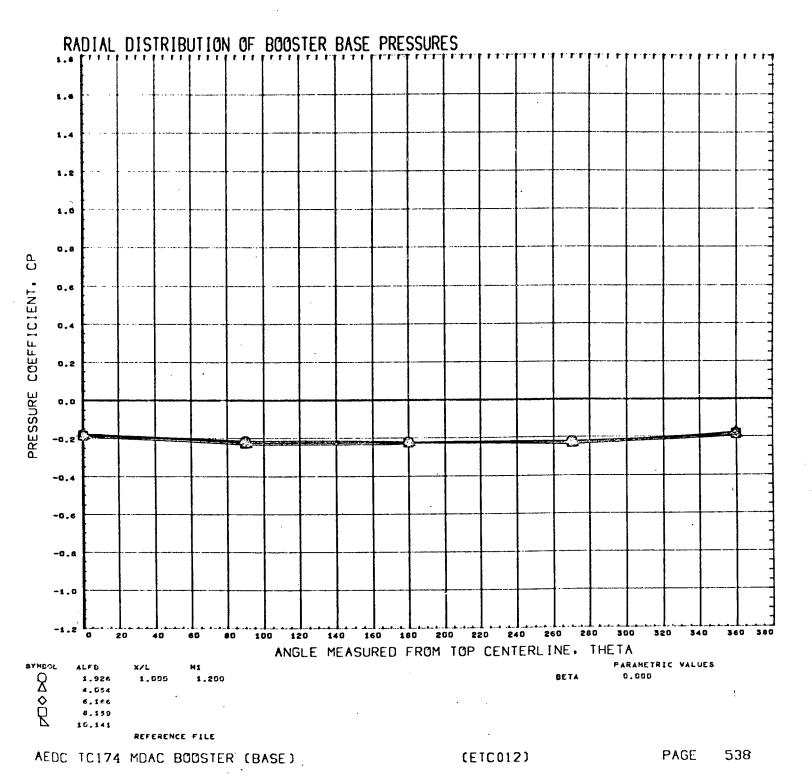


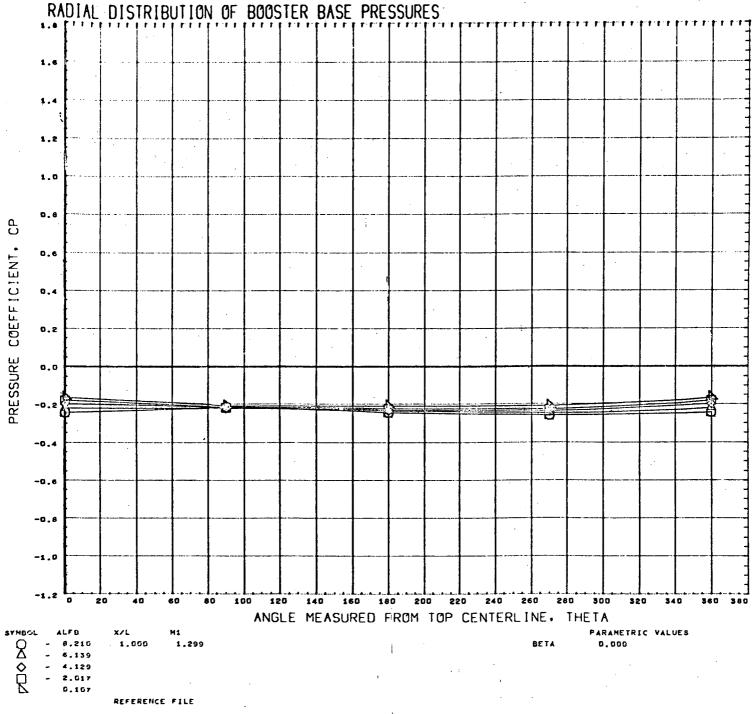






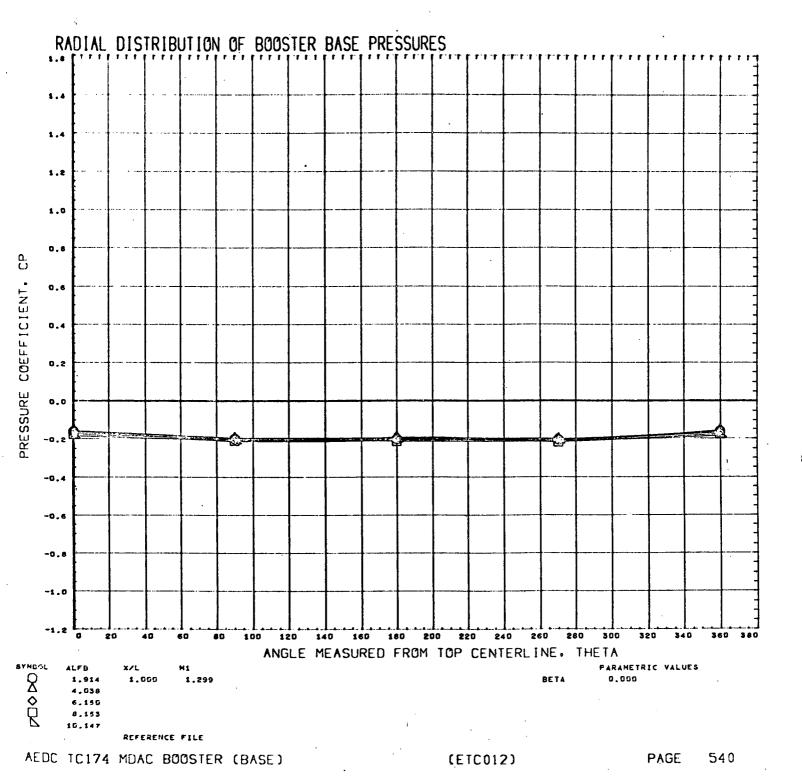


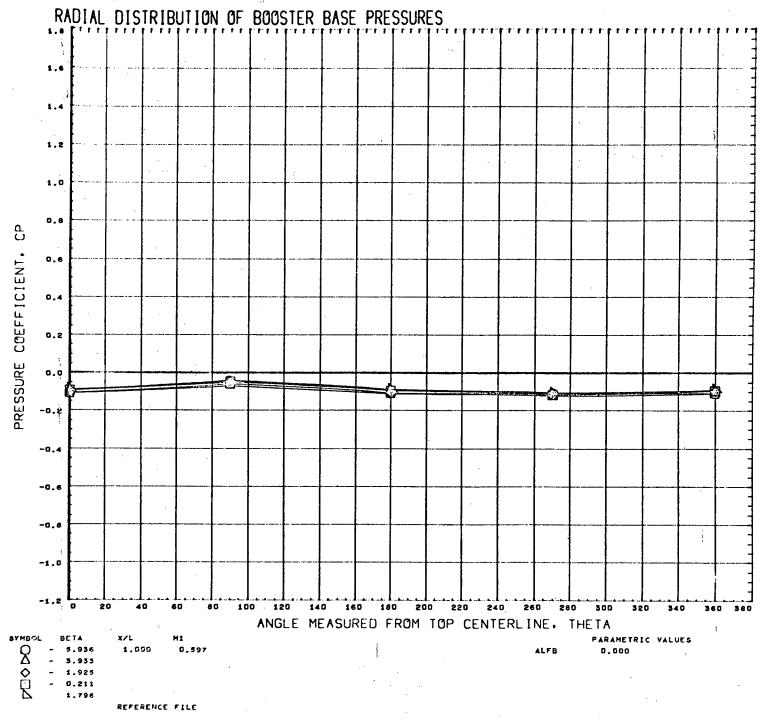




AEDC TC174 MDAC BOOSTER (BASE)

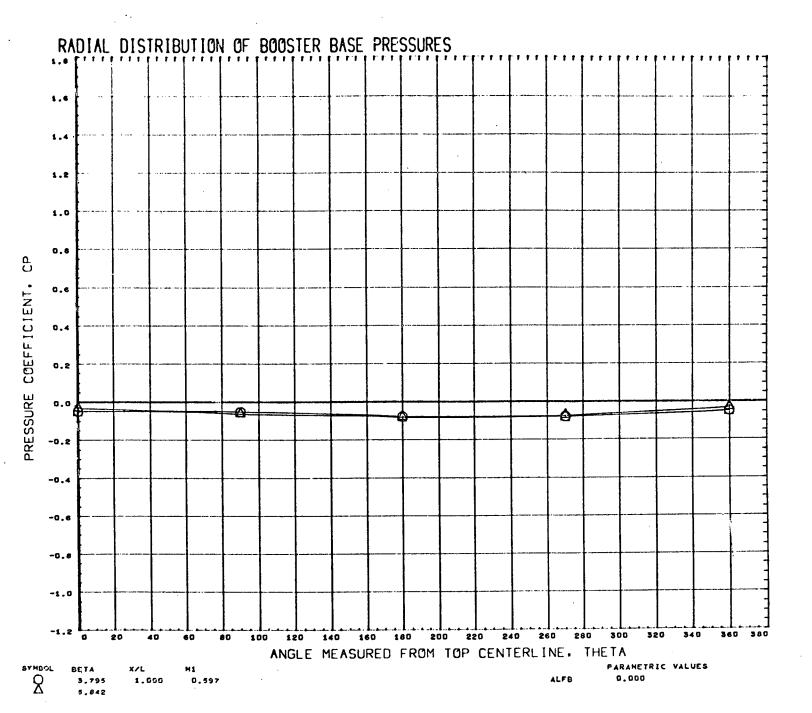
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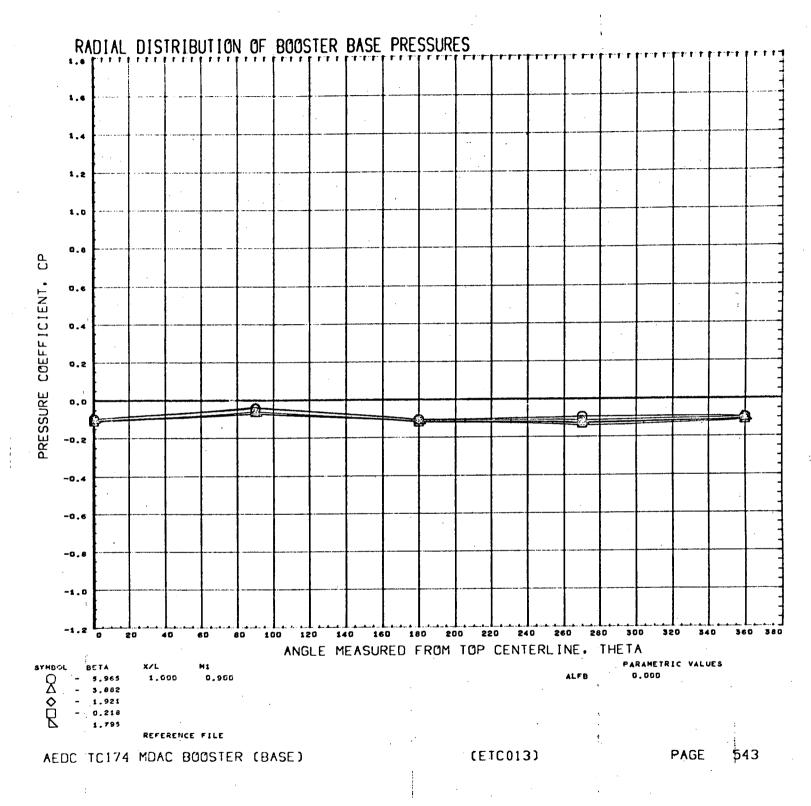
AEDC TC174 MDAC BOOSTER (BASE)

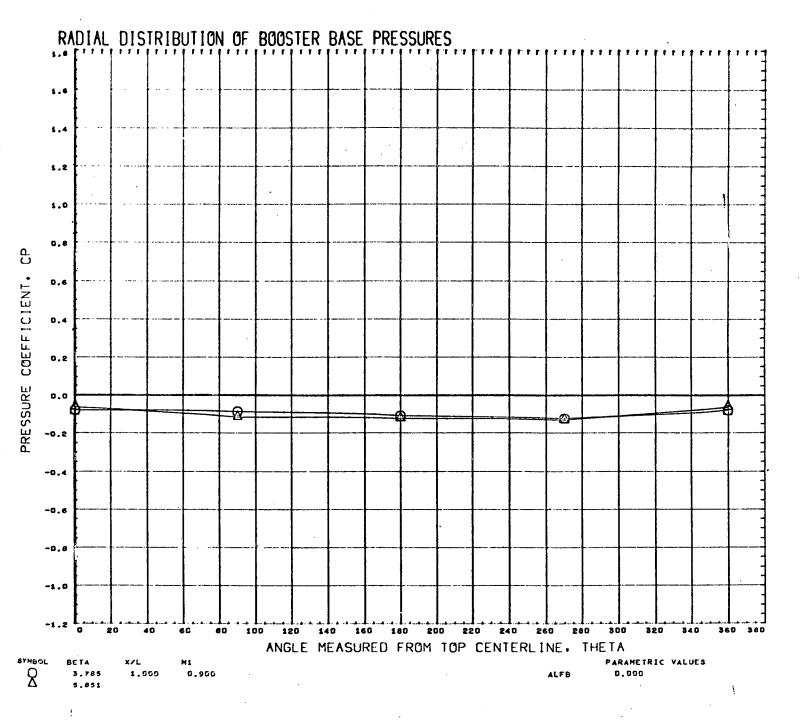
(ETC013)



AEDC TC174 MDAC BOOSTER (BASE)

(ETC013)

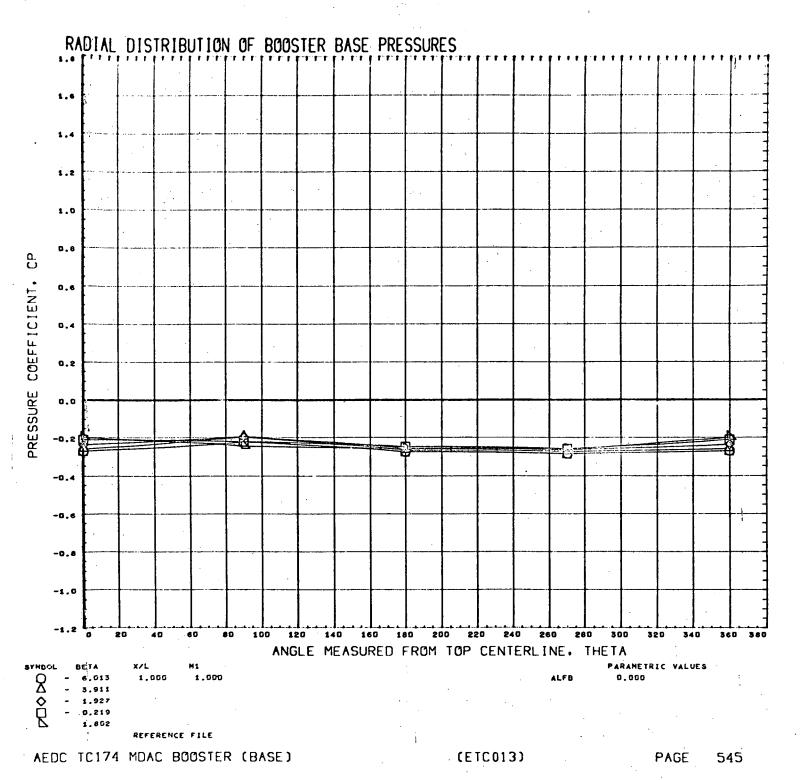


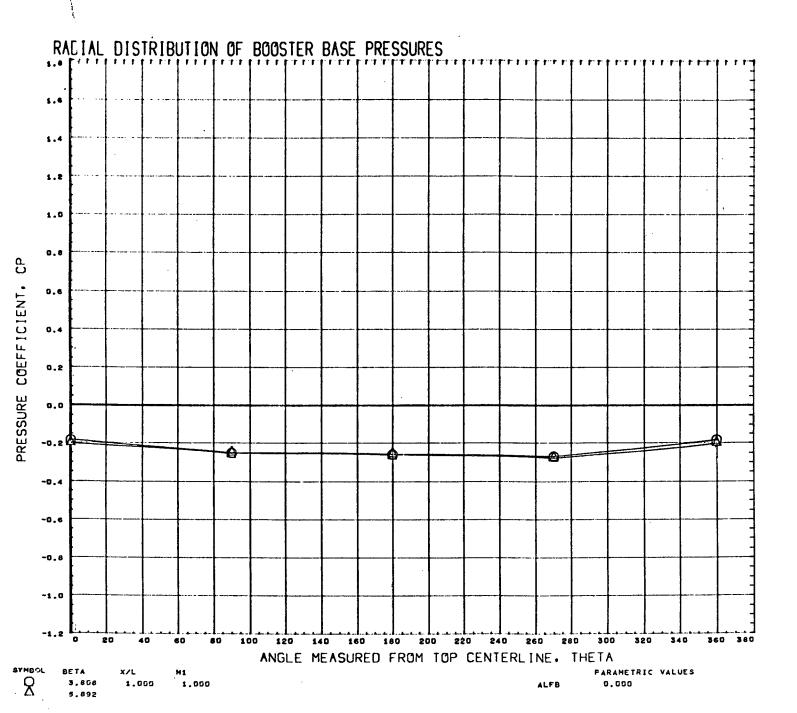


AEDC TC174 MDAC BOOSTER (BASE)

(ETC013)

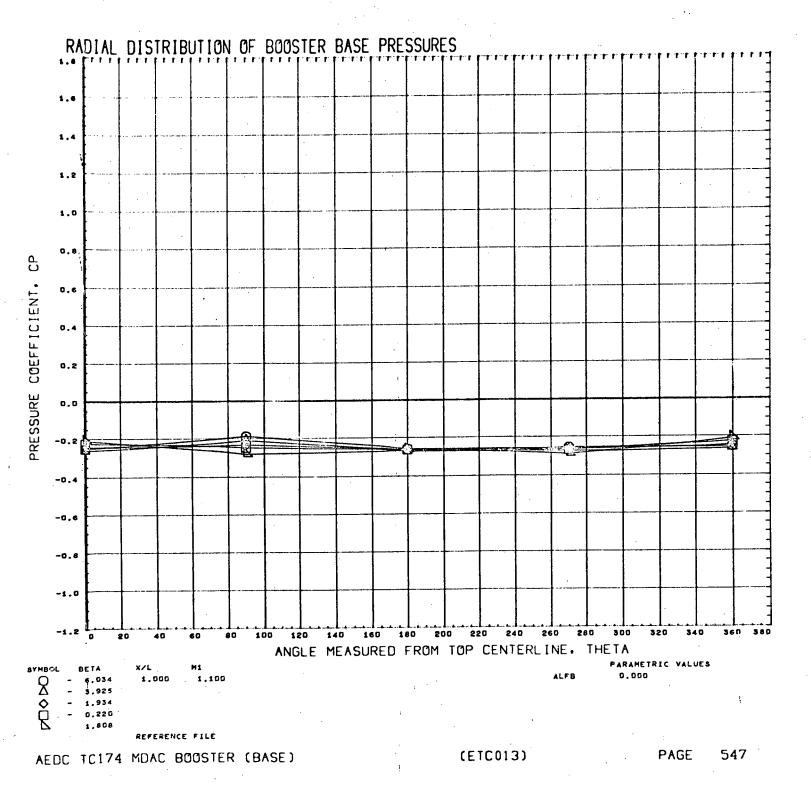
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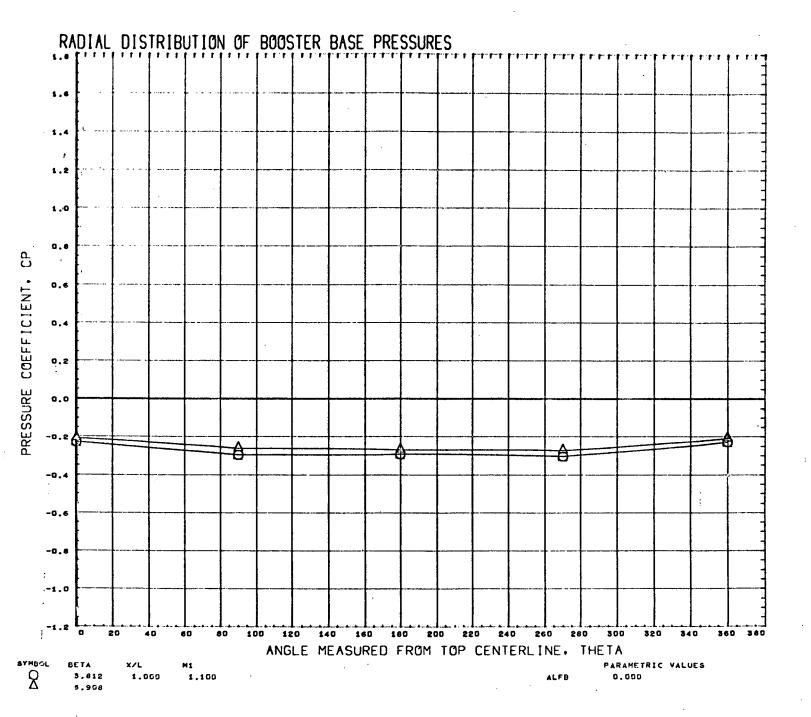




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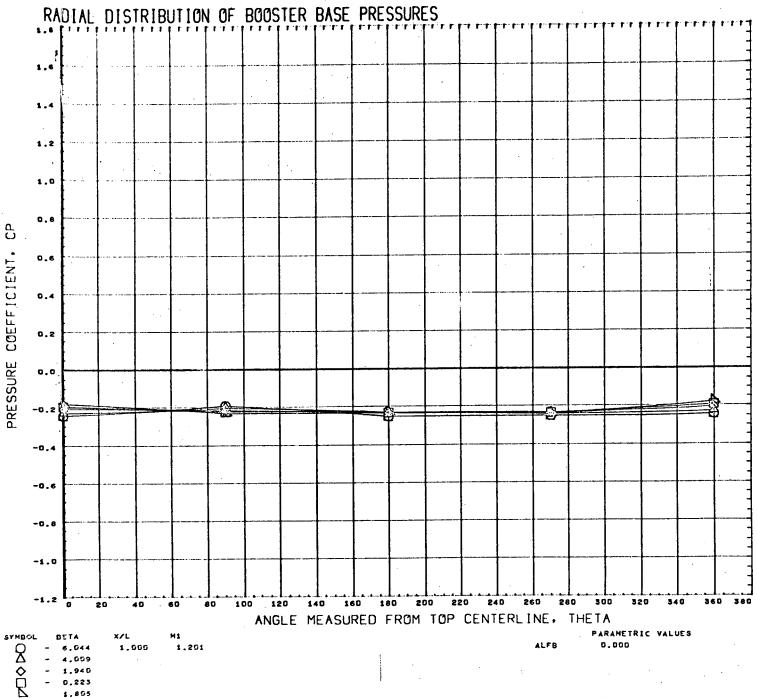
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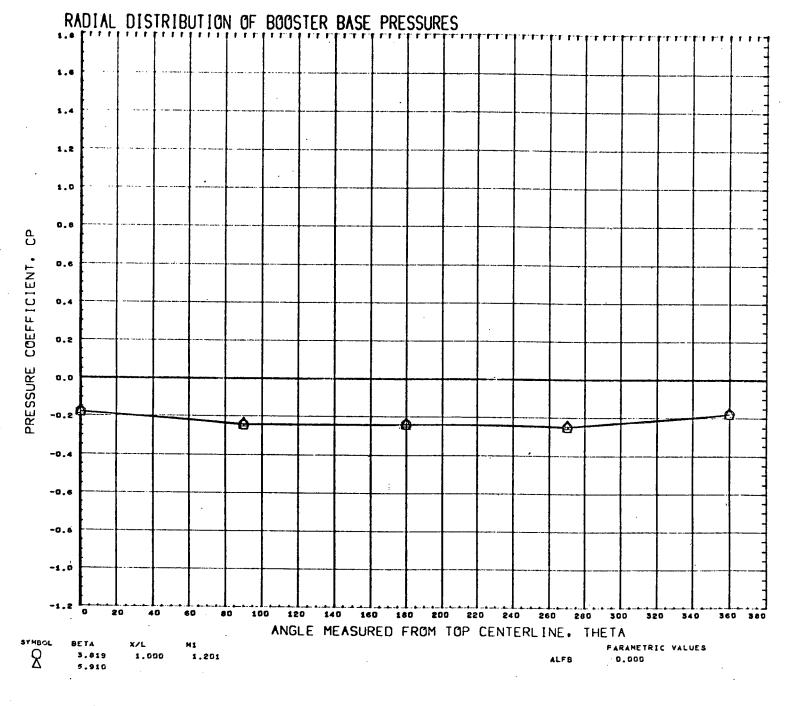
AEDC TC174 MDAC BOOSTER (BASE)

(ETC013)



AEDC TC174 MDAC BOOSTER (BASE)

(ETC013)

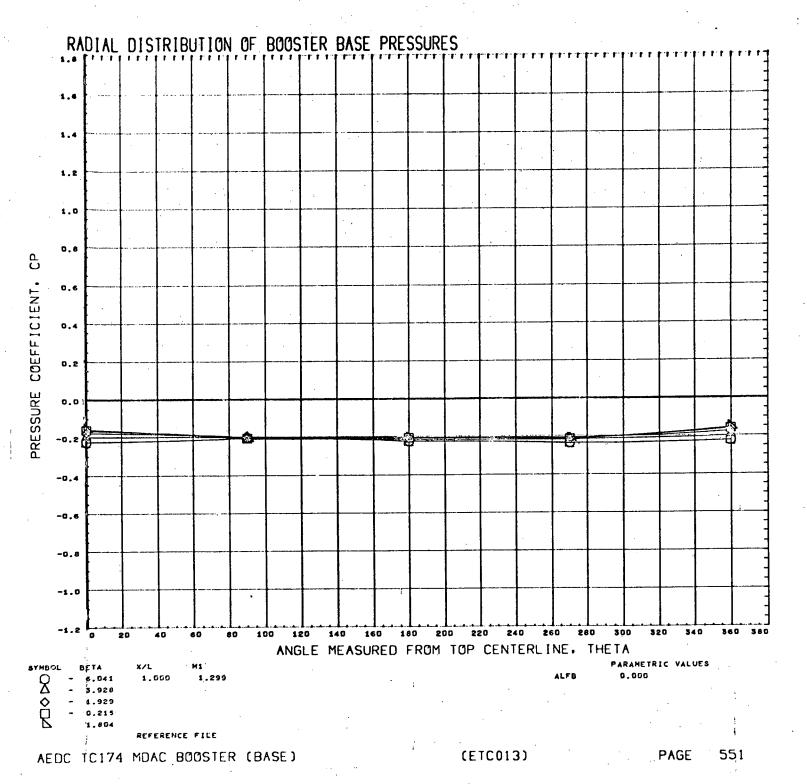


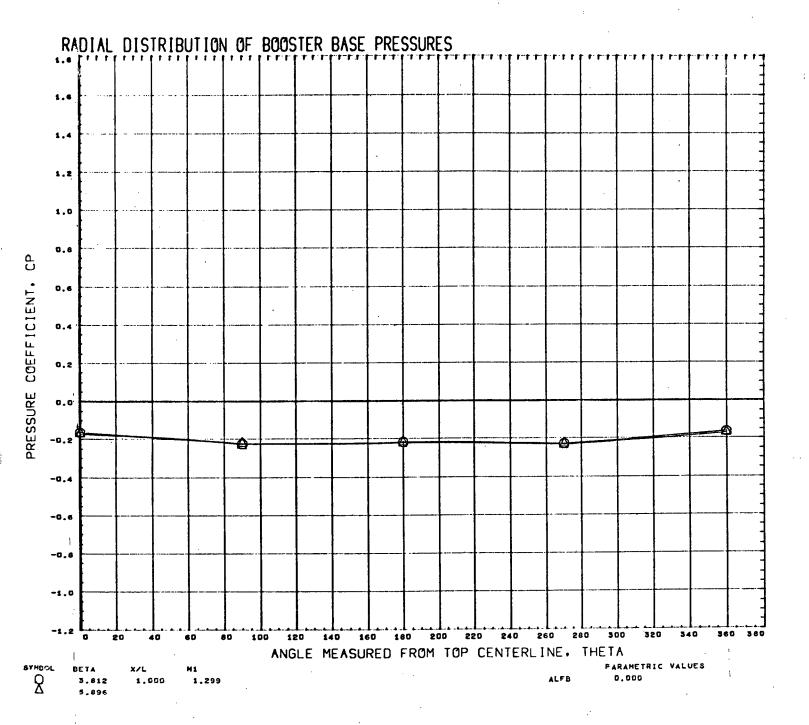
AEDC TC174 MDAC BOOSTER (BASE)

(ETC013)

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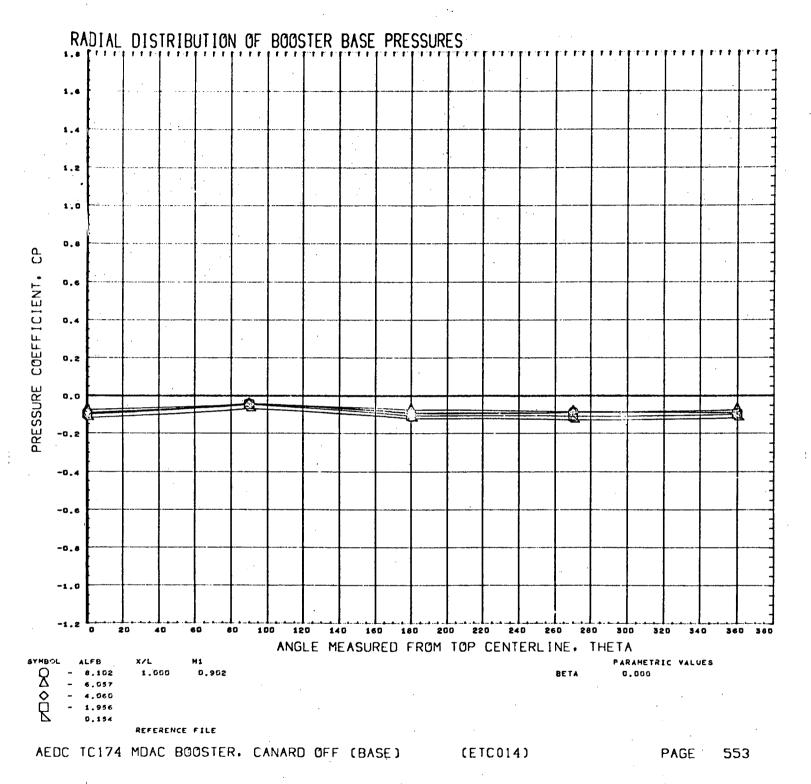


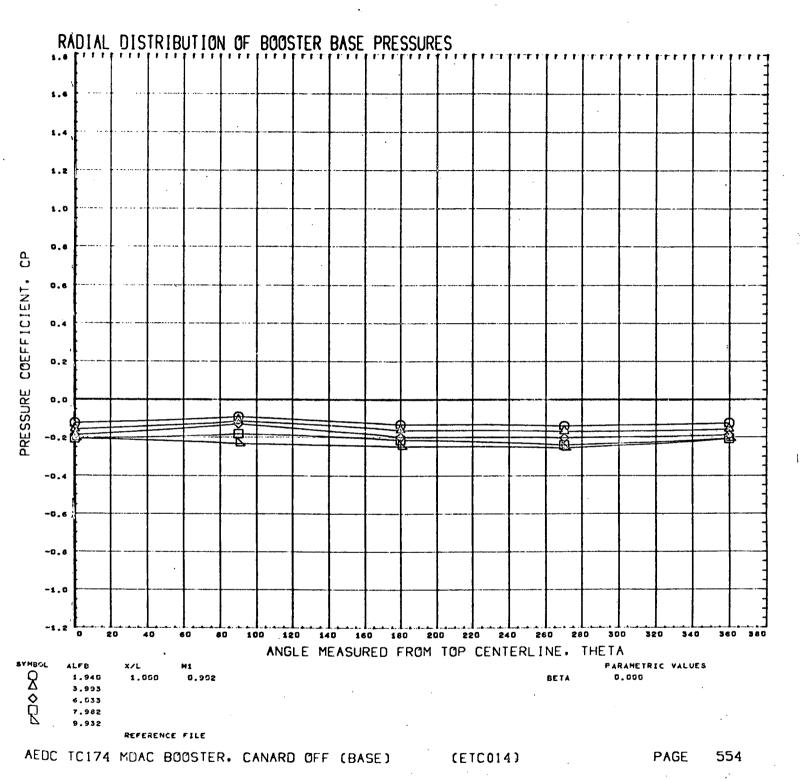
AEDC TC174 MDAC BOOSTER (BASE)

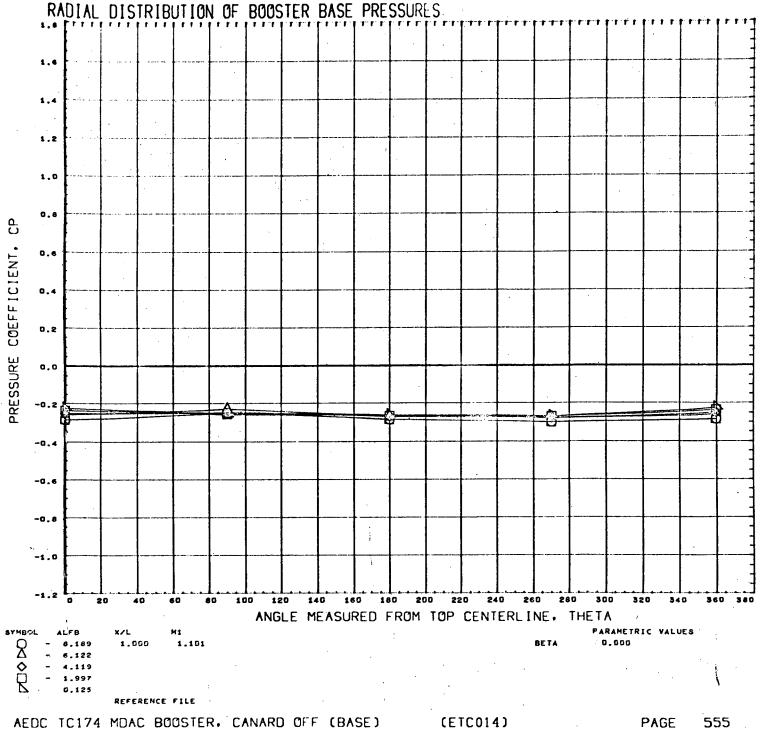
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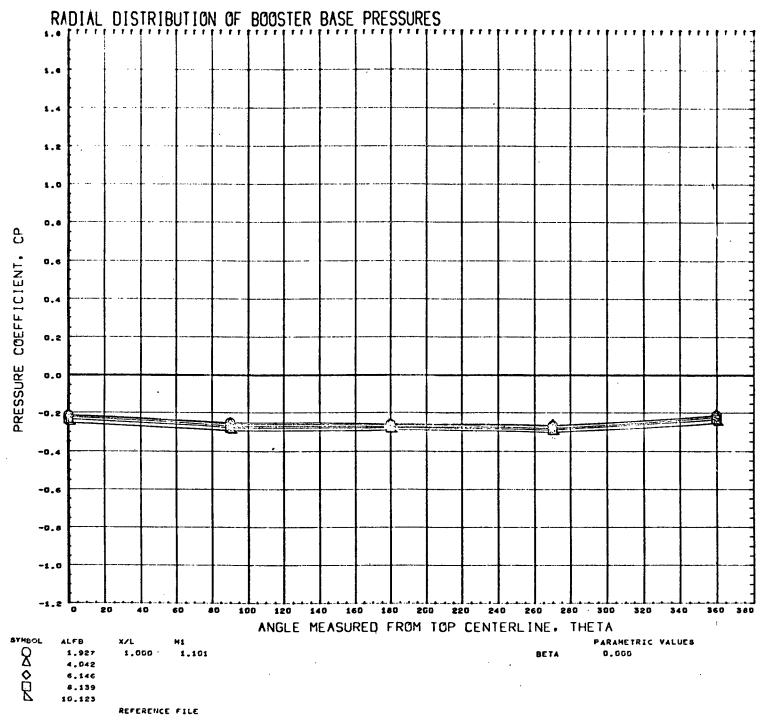






AEDC TC174 MDAC BOOSTER, CANARD OFF (BASE)

(ETC014)



AEDC TC174 MDAC BOOSTER. CANARD OFF (BASE)

(ETC014)

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